Gas Journal

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Editorial Notes

Gas Prices Report

THE Report has been published of the Joint Committee of the House of Lords and the House of Commons on Gas Prices. This Committee was appointed following the public outcry against the compulsory three-step tariff introduced towards the end of last year by the South Metropolitan Gas Company, who, after a few weeks' bitter experience, bowed to the storm and withdrew the tariff pending the findings of the Enquiry. They did this, however, without in any way modifying their belief that the principle of the new system of charging for gas was thoroughly sound and equitable. Since then they have freely admitted at the Enquiry that the introduction of the tariff, though economically justified, was, in its particular form, commercially and psychologically unwise. A full report of the proceedings at the Enquiry, which occupied a hearing extending over twelve days, has been published in the "JOURNAL," and has, we know, been very closely followed. So much was at stake for the Gas Industry, for the Joint Committee was set up to enquire into the powers possessed not only by the South Metropolitan Company but by all basic price companies, and "to consider whether adequate protection is afforded to the interests of the different classes of gas consumers under such powers, and to report what action, if any, is necessary."

It will be recalled that the main proposals of the London County Council were the compulsory publication, under Section 6 of the Gas Undertakings Act, 1934, by every basic price company of the price at which the company is prepared to supply ordinary consumers, and the setting up of a tribunal to review this price. Counsel for the South Metropolitan Company intimated that, if the Company introduced a tariff, ample notice would be given, and if the L.C.C. objected on the ground that under the tariff the price to the small consumer would be unreasonably increased, the Company would not bring the tariff into operation until it had the approval of the Board of Trade. The case for the National Gas Council, the Gas Companies' Protection Association, and the Gas Light and Coke Company was deprecation of any tribunal at all being given further control over gas companies in the way suggested either by the London County Council or by the South Metropolitan Gas Company. In his evidence Sir David Milne-Watson stressed before the Joint Committee the extreme undesirability, from the point of view of public interest, of anybody being able to control prices or to prevent an increase in the actual price which in the particular circumstances a company found inevitable—the importance of not placing upon the Gas Industry restrictions stronger than those placed upon electricity undertakings.

The Force of Competition

SUCH were the issues at stake, and the Report of the Joint Committee is necessarily of the utmost importance to the future of the Gas Industry. The findings of the Committee will, we are sure, be generally welcomed; and it is to be hoped that the recommendations made will be passed into legislation. The unfortunate experience of the South Metropolitan Gas Company has resulted in a consideration of policy the outcome of which is destined to benefit the whole Industry. The Joint Committee, in their Report, reviewing the case of the South Metropolitan tariff, consider that its abrupt introduction was a mistake; but they accept the evidence that a flat rate is inequitable, that it is necessary to adopt a tariff in order to compete for the custom of large consumers, and that only by spreading the fixed charges over a larger supply is it possible to cheapen the price of gas to all classes of small consumers. Such a mistake, they point out, could never be prevented by the basic price system; the South Metropolitan Company were checked not by the basic price system but by public opinion. In theory, any basic price company can raise its price unreasonably to one section of its consumers and escape control by reducing its price to another section. There are, however, two effective safeguards against excessive or unreasonable charges—public opinion and competition. Competition, the Committee maintain, will more and more protect the public from overcharge; and the recommendations they make,

with which we shall deal later, are designed " chiefly to avoid similar errors of business tact in the future."

The Gas Industry passed from a phase of competition to one of monopoly; it has returned to competition. " The effective monopoly of gas has ended, and with it both the risk that the companies will make excessive profits and the protection afforded by the basic price system against excessive dividends have been reduced. . . . In effect the protection against overcharge which was afforded by the basic price system is now given by competition." The Committee are of opinion that no new formula is needed, or indeed can be found, which would give the necessary freedom to the Gas Industry to meet competition and at the same time provide absolute and lasting protection to all classes of consumer. The basic price system does not cramp the Industry, and in general it affords protection; and it is the Committee's view that it should be continued.

It is naturally gratifying, after a long and exhaustive Enquiry, to have the Committee's expressed appreciation that the Gas Industry, in the midst of fierce and growing competition, must have full freedom to operate. At the Enquiry it was suggested by Counsel for the London County Council that in the case of poor consumers a gas company had something approaching a monopoly as against electricity, owing to the price of gas, and that these consumers should therefore be protected. In his evidence Sir David Milne-Watson quickly exploded this notion. He pointed out that the fiercest competition from electricity which the Gas Light and Coke Company had to face was in East Ham, West Ham, Fulham, Marylebone, and St. Pancras, in all of which areas there were very large working-class districts. There was, he said, no justification for suggesting that there was even a substratum of consumers who were not protected by competition. The Committee are in agreement. In their Report they state simply that " the suggestion that electricity does not compete for the custom of poor working-class districts seems remote from the facts." Again, even in a district where there is at the moment no electricity available—as in part of Newcastle—the price of gas in that district is controlled by the competition of electricity in other districts of the town, because the same prices must be charged for gas over both areas.

National Defence

On several occasions in these columns we have referred to the unique value of the Gas Industry in relation to national defence. The Government's anxiety to preserve peace must involve full recognition of what the Gas Industry means to the safety of the country. Its activities in peacetime fit it in a peculiar way to become an instrument of defence. Should the need arise, our Industry, in the production of benzole and toluole as bases for explosives, would once again assume the status of a " star " industry, and in the production of tar oils as a raw material for hydrogenation to petrol it would be of help to the nation. This question of national defence is not overlooked by the Joint Committee on Gas Prices; and it is recorded in the Report that during the last war the Gas Light and Coke Company alone produced tri-nitro-toluene and other explosives sufficient to fill 160,000,000 shells, as well as 70 million gallons of fuel oils, and enough tar to tar the whole of the roads on the Western front. In regard to oil competition, the Committee state that if a choice must be made between gas and oil, gas ought not to be handicapped in this competition; and in regard to electrical competition, it is " contrary to public interest to lay burdens on gas to which electricity is not subject, or even to permit gas as the older of two competitors to suffer any longer than is necessary from adhesions of restraint because of a monopoly which it once enjoyed but has lost."

This leads the Committee to discuss the question of giving the Gas Industry power to impose a minimum charge for giving a supply of gas. It will be remembered that in their second interim report issued in 1933 the Gas Legislation Committee—the Wrottesley Committee—recommended that gas undertakers should be authorized by general legislation to impose a special charge on consumers whose premises remain connected to the undertakers' mains for stand-by purposes only; and that they should also be authorized to impose minimum quarterly charges calculated on the basis of an assumed consumption of 10 therms per quarter. The latter recommendation was turned down by the Parliamentary Secretary to the Board of Trade, who, while not attempting to justify the exclusion of a minimum charge on the ground of logic on technicality, argued that it would be politically unwise to grant the power. The Joint Committee state that this decision should be re-considered, and they recommend what the Wrottesley Committee recommended in 1933. It is to be hoped that this time the measure will not be opposed. In regard to stand-by supplies, a clause of the Act of 1934 enables undertakers to make an annual charge in addition to the charge for gas in cases where gas is used as a stand-by, so that the Joint Committee's recommendation in respect of this item would appear to be unnecessary unless the view taken on what constitutes a stand-by supply is different from the interpretation of the 1934 Act.

Recommendations

On later pages will be found the Report of the Joint Committee, and it will be seen that it is recommended that the basic price and dividend system should be retained, but that power should be granted to the Board of Trade, on the application of a local authority or a gas company, to revise the basic price of any gas undertaking; and that undertakers should be required to publish particulars of the " ordinary " price at which they are prepared to supply gas. We have already referred to the recommendation concerning the power to impose a minimum charge. A further recommendation is that a gas undertaker wishing to increase the ordinary price by more than 12½% within any period of three years, or to impose a minimum charge, should not proceed with this intention without the sanction of the Board of Trade. Then, in regard to bulk supplies, the Committee recommend the adoption of the principle of the Wrottesley Provision in the second interim report of the Gas Legislation Committee, which set out a scale for reduction in dividend authorization according to the price at which gas is sold in bulk. They consider, however, that it would be unwise to apply a uniform scale to all gas undertakings. The scale fixed should be appropriate to the business and prospects of the individual undertaking.

The only other point to which at the moment we will refer relates to the internal unity of the Gas Industry. Time and again we have emphasized the need for our Industry to present a united front; and the Committee hold that the National Gas Council should be 100% representative of the Industry. They hold that, if this were so, " the common sense of the Industry as a whole would

have force to prevent any clash with public opinion." The view is expressed that those undertakings at present aloof from the N.G.C. would best serve the interests of their consumers, shareholders, and colleagues in the Industry by joining " to make the Gas Council both comprehensive and effective as a centre and adviser in advance on any departure in tariff or policy by one undertaker which may ultimately involve the whole Industry."

We know that the fullest possible consideration will be given by those whom it most concerns to an expression of such weighty opinion. If, after due deliberation, they decide to enter the fold, they will be certain of an exceedingly warm welcome. Nothing, too, would appear more sure than that the added strength which would accrue to the Gas Industry as a whole by their adhesion would work to their benefit in many more directions than that visualized by the Joint Committee.

Coke Oven Gas in Scotland

THE subject of coke-oven gas and its economics has been before the West of Scotland public for a long time. So much has been written about it in the technical and news Press, so many meetings of parties interested have been held, such wide diversity of opinion has been expressed since publication of the West of Scotland Gas Supply Committee's report, that the present seems a suitable time for recapitulation and consideration of the various views and claims advanced.

The use of coke-oven gas in the West of Scotland is not a new departure. For many years Glasgow Corporation Gas Department has drawn approximately 700 million cu.ft. a year from the Auchengeich Coke Ovens at Chryston. But public interest had been stirred by the proposal of two other firms to erect coke-oven plants. These firms quite naturally wished, before undertaking heavy capital outlay, to be assured of a steady (and remunerative) outlet for the surplus gas produced, and while one of them, unable so far to secure such assurance, has taken no further step towards the erection of plant, the other, similarly without assurance of gas outlet but more fortunately situated geographically, has gone boldly ahead and its plant is now in production.

We say " more fortunately situated," because its works are actually within the City of Glasgow. Possibly the firm felt that because of the minimum cost of distribution the gas could be passed into the city mains at a price attractive to the Corporation. Possibly it considered that public opinion would protest against gas being burned to waste. Possibly its business instinct foresaw a long period of prosperity in which, because of increased profits, revenue from sale of gas would lose some of its earlier importance. Possibly it has felt its position strengthened by the interest of the Special Areas Commissioner and the legislative action which might follow his enquiry. Whatever its interest, the plant is now in operation and is producing gas, some of which is burning to waste.

Now, it is simply absurd that any part of Britain's most valuable (and unreplaceable) resources should be wasted, and in the ordinary course of business—without outside interference—doubtless some mutually advantageous arrangement between would-be seller and possible purchaser would have been reached.

But unfortunately, it would appear, the Government in its anxiety to mitigate the evils of unemployment appointed the Special Areas Commissioner to make recommendations as to new sources of industry. His attention was quite naturally directed to bettering the labour condition in Lanarkshire and from this point—his preparation of a report—and the subsequent appointment of a Committee of Enquiry, the whole question was taken from its proper economic sphere and became a political matter with all its attendant repercussions.

At present, the predominant partner in the proposed gas grid—Glasgow—is taking no coke-oven gas. Its long standing agreement with Auchengeich terminated recently and has not been renewed because of difference of opinion in the matter of price. Govanhill is burning gas to waste. The Gartsherrie scheme is in abeyance. Glasgow will not consider displacement of its own labour to accommodate Lanarkshire.

Question of Stand-By Plant

THE Gas Supply Committee report has cleared up the issue to this extent. It does not consider economic the supply of coke-oven gas to Renfrewshire, but, as the question will certainly emerge again, it may be of interest to consider how undertakings—the largest of which is trifling compared with Glasgow—would be affected by the proposal that any new development should have every advantage in the disposal of its by-product at the cost of the principal product of an old established industry. For it does appear that coke-oven gas is to its producers just what gas coke is to the ordinary gas producer—an incidental, however potentially valuable, part of the process of production, which can command only a price varying from time to time as the law of supply and demand, despite modern effort to abrogate it, dictates.

Now, quite obviously, there is not going to be immediately an outlet for all the new coke-oven gas available. Some existing undertaking must produce less to allow of the most economic working of the coke-oven process, and the only undertaking not so disadvantaged will be that to which the coke-oven producer may say " Shut down your carbonizing plant. I will give you all the gas you need. I will take over the financial liability of your capital now unproductive. Your only future works extension will be in the nature of storage, and that only in the natural growth of your consumption." For anyone else who has to keep carbonizing plant and staff standing by, either daily or seasonally, for peak or emergency load and who is therefore making less gas than he ordinarily would, a coke-oven supply has no attraction, and certainly no one who would be so affected is so altruistic that he would sacrifice his own undertaking for the benefit of the coke-oven interest.

So, while many uninformed people speak easily of the unwillingness of the Gas Industry to co-operate in a scheme designed to bring prosperity to depressed Lanarkshire, there are some aspects of the case which seem worthy of consideration on its behalf. We have endeavoured in this short note to summarize the case as we see it.

Hydrogenation at Billingham

AN important statement concerning the operation of the coal and oil hydrogenation plant at Billingham was made by Lord McGowan at the annual meeting last week of Imperial Chemical Industries. This plant, it may be recalled, was planned for a yearly production of 100,000 tons of petrol from the hydrogenation of coal and 50,000 tons from tar oils; and the enterprise was rendered possible only by the assurance provided by the British Hydrocarbon Oils Production Act, 1934, of a continuance

of the protection afforded to home production. Lord McGowan, having pointed out that he was not called upon to disclose the financial results of the venture, stated that up to date the hydrogenation plant has not shown results which would justify its description as a good commercial proposition even with the advantage of the existing Customs duty, and that without that protection the enterprise would, of course, be uneconomic. More difficulties, he explained, had been encountered than were anticipated, though throughout last year there was a steady improvement in the working of the plant. He continued that, "notwithstanding the great publicity recently given to alternative methods, we are satisfied that the hydrogenation system is the best technical and commercial process for the conversion, without creating by-products, of coal into motor spirit." In view of the complex technique of the high-pressure process at Billingham, Lord McGowan's general statement as to its not being a good commercial proposition was to be expected. Apart, however, from the hydrogenation of coal into petrol, the Billingham plant is developing a new field of chemical industry, from which, it was remarked at the meeting last week, Imperial Chemical Industries are already deriving benefits of considerable value.

Also of direct import to the Gas Industry are the comments of Lord McGowan concerning the fertilizer position. When the huge synthetic fertilizer units were put into operation at Billingham Imperial Chemical Industries had no difficulty in disposing of the full output. Since then there has been a world-wide movement to build synthetic nitrogen factories, and in recent years the market has been saved from chaos only through international agreements. World production capacity is far in excess of demand, and the position does not improve. In point of fact, sales of fertilizer nitrogen from Billingham in 1936 fell by no less than 28%. Again, the prosperity of the iron and steel industry may be expected to cause further increases in by-product nitrogen. In this country nitrogen prices are low and will not support high capital figures; and Lord McGowan explained that the whole of the investment on the Billingham synthetic nitrogen plant has been revalued in the light of a conservative estimate of its prospects. One other matter which concerns our Industry was commented on by Lord McGowan—the growing interest in dried grass. We have already referred in these columns to the possibilities of the use of coke for grass drying and have given a description of the coke-fired plant for this purpose. This development represents a market not only for coke but also for sulphate of ammonia, and we mentioned a short time ago that the British Sulphate of Ammonia Federation have taken over two farms in order to study the technique of all operations connected with the artificial drying of grass. Lord McGowan observed last week that, so far as the knowledge and experience of Imperial Chemical Industries go, they have every reason to hope that grass drying can be of material assistance to the agricultural industry and provide a new source of British-grown feeding materials. The London and Counties Coke Association, as is well known, are watching the process closely.

PERSONAL

Retirement of W. N. Westlake.

At a meeting of the Directors of the Exeter Gaslight and Coke Company on April 26 they received and accepted the resignation of the Engineer and General Manager, Mr. W. N. Westlake, and passed the following resolution.

> "That the Directors of the Exeter Gaslight and Coke Company in pursuance of Mr. Westlake's expressed desire to retire from his office as Engineer and General Manager at an early date, accept his resignation with great regret, and in so doing wish to put on record their deep sense of obligation to him for the services he has rendered to the Company over the lengthy period of fifty years, during twenty-eight of which he has occupied his present position.
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> "The records of the Company are in themselves eloquent of the work Mr. Westlake has performed, and the Directors feel that, after the stress and anxieties of his work during the Great War, and the practical reorganization of the Company's works and offices, the latter of which involved the carrying on of the large business of the Company for a long period in premises which were being practically rebuilt, he is fully entitled to look forward to a more restful life.
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> "Mr. Westlake's activities have not been confined to the routine work of the Company and he has for a long period been actively interested in the work of the National Gas Council, the British Commercial Gas Association, and The Institution of Gas Engineers and other bodies, which has been of great benefit to the Company.
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> "The Directors sincerely hope that Mr. Westlake may have many years to enjoy the leisure he has so well earned."

In March, 1917, Mr. Westlake succeeded the late W. Doig Gibb as President of the Southern Association of Gas Engineers and Managers. In consequence of the large and continuous increase of business the Directors of the Exeter Gaslight and Coke Company in 1924 decided to relieve Mr. Westlake, who was then filling the positions of Engineer, Manager, and Secretary, of the purely secretarial duties so as to enable him to devote the whole of his time to more important work.

During the past 28 years the business of the Undertaking has grown considerably. The sale of gas in 1908 was 298 million cu.ft., whereas in 1936 this has risen to 753 million cu.ft. The date from which the resignation is to operate is a matter for future arrangement.

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Mr. P. C. Holmes Hunt, M.Inst.C.E., F.I.C., who has been resident in Australia for many years, is arriving shortly on a brief visit to the Old Country. Mr. Holmes Hunt is the first President of the recently formed National Gas Association of Australia, having previously been Chairman for many years of the Gas Companies' Association of Australia.

Many of the older members of the profession may remember that Mr. Holmes Hunt went to Australia as Assistant Engineer to the Metropolitan Gas Company of Melbourne. After being Engineer for several years he left the service of that Company to become Chairman and Managing Director of the Colonial Gas Association, and took up consulting work. For over 20 years he was Consultant to the leading Gas Undertakings in Sydney, Newcastle, Adelaide, and Hobart. For a long time he has been a prominent figure in the Gas Industry. Mr. Holmes Hunt's activities, however, are not confined to the Gas Industry; he is Chairman of the Mount Lyell Mining and Railway Company, a large, and the only, copper producing mine in Australia, which has also large interests in several superphosphate and chemical companies.

Mr. Holmes Hunt is paying a very brief visit to England for the marriage of his daughter, which will take place in June, but he expects being able to attend the Institution Meeting.

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At the annual meeting of Alnwick Urban District Council on April 22, Mr. C. Turnbull, Managing Director and Secretary of the Alnwick Gas Company, was elected Chairman for the ensuing year. Proposing Mr. Turnbull's election, the retiring Chairman, Mr. F. Eltringham, referred to him as the "father" of Council of which he has

been a member since 1902. With the exception of a period of two years, Mr. Turnbull has served the town for 33 years.

Mr. Turnbull returned thanks to the members and said it was something unprecedented to be twice Chairman of the Council. It was 19 years since he had vacated the office of Chairman after two-and-a-half years of office.

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The engagement was recently announced of Nancy Louisa, daughter of Mr. and Mrs. FRANK HARDING JONES, of Housham Tye, Harlow, Essex, to Lord Walpole.

Lord Walpole, who is 24, succeeded to the two Baronies of Walpole on the death of his cousin, the Earl of Orford, in 1931.

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Messrs. John Bowes & Partners, Ltd., Colliery Owners, Milburn House, Newcastle-upon-Tyne, 1, announce they have appointed Mr. W. DIAMOND, who has been in charge of their Marley Hill Coke Works for many years, as Adviser to the Company on all matters appertaining to carbonization throughout their undertaking.

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Sir HERBERT BLAIN has been appointed Chairman of Messrs. Joseph T. Robin, Ltd., Gas Mantle Works, Streatham Vale, S.W. 16.

The Institution Secretaryship

As we go to press we learn that Mr. W. T. K. BRAUNHOLTZ, Ph.D. (Cantab.), M.A., F.I.C., has been appointed Secretary of The Institution of Gas Engineers. Dr. Braunholtz has been Technical Assistant to the Institution since the beginning of 1935.

Correspondence

Scottish Eastern Juniors' Visit to Bruce Peebles & Co.

SIR,—In your issue of April 28, you report a visit of the Scottish (Eastern) Juniors to the Works of Bruce, Peebles, & Co., Ltd., Electrical Engineers, East Pilton, Edinburgh. "Bruce" is a Christian name, not a surname. It may interest your readers to know that the Firm is an offshoot of D. Bruce Peebles & Co., and was founded by my father, the late Mr. David Bruce Peebles, at this address, in 1898. In 1903 the Electrical Branch, requiring more room, was moved to the new Works built at East Pilton. In 1908 the two businesses were split up again, the Gas Department carrying on as before at Tay Works under the present name of Peebles & Co., Ltd.

Yours, &c.,
W. CARMICHAEL PEEBLES.

Tay Works, Bonnington,
Edinburgh.
April 30, 1937.

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Page 22. EXETER. W. N. Westlake, E. & G.M., retired.
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Page 136. COLOMBO. H. E. Stone appointed E. & G.M., vice S. Barker Johnson, retired.
Page 154. BRITISH ROAD TAR ASSOCIATION. D. Pratt appointed Chairman, vice Sir Reginald Clarry, retired.

Forthcoming Engagements

May.

6.—FEDERATION OF GAS EMPLOYERS.—Central Committee Meeting at Gas Industry House, 11.30 a.m.; Annual General Meeting at Grosvenor House, Park Lane, W., 3.15 p.m.

6.—N.G.C.—Meeting of the Central Executive Board at Gas Industry House, 12 noon; Annual General Meeting at Grosvenor House, Park Lane, W., 2.30 p.m.

6.—MIDLAND JUNIORS.—Annual General Meeting.

7.—LONDON AND SOUTHERN JUNIORS.—Annual Business Meeting at the London School of Hygiene and Tropical Medicine, Keppel Street, W. 1.

7.—NORTH OF ENGLAND ASSOCIATION.—Paper by J. E. Dixon (Newcastle-upon-Tyne), "Fuel Problems on Gas-Works."

7.—WALES AND MONMOUTH JUNIORS.—Annual General Meeting at Cardiff.

15.—SCOTTISH (EASTERN) JUNIORS.—Annual General Meeting at Dunfermline.

22.—YORKSHIRE JUNIORS.—Meeting at Halifax; short Papers by Mr. C. Daughtery (Leeds) and Mr. J. Castle (Brighouse).

24.—I.G.E.—Research Executive Committee; Special Meeting to consider Research Programme for 1937-38, 2.30 p.m.

27.—B.C.G.A.—Manchester District Conference at Oldham.

27.—WALES AND MONMOUTHSHIRE ASSOCIATION.—Annual Meeting at Cardiff.

June.

1-4.—I.G.E.—74th Annual General Meeting, Royal Geographical Society Hall, Exhibition Road, Kensington, S.W. 7.

9.—COKE SALESMEN'S CIRCLE.—Visit to Crane, Ltd., Ipswich.

18.—NORTH OF ENGLAND ASSOCIATION (AUXILIARY).—Meeting at Middlesbrough.

19.—LONDON AND SOUTHERN JUNIORS.—Summer Visit to Luton.

23.—I.G.E.—Pipe Committee, 3 p.m.

25.—I.G.E.—Joint Lighting Committee, 2.30 p.m.

25.—B.C.G.A.—Annual Conference in Scotland at Peebles Hydropathic.

July.

2.—I.G.E.—Joint Committee on Complete Gasification under Pressure, Department of Scientific and Industrial Research, 16, Old Queen Street, S.W. 1, 3 p.m.

15.—I.G.E.—Gasholder Committee, 2.30 p.m.

The Coal Position

Serious Shortage at Dundee

We continue to receive reports from various centres concerning the serious shortage of coal and the impossibility of securing supplies of suitable quality. In consequence stocks have been reduced to dangerously small dimensions. At Dundee, although the position is not so serious as at Edinburgh and Glasgow, grave inconvenience is occasioned by the fact that the colliery owners are not covering requirements for this year at all.

The Engineer and Manager, Mr. John Wilson, states the Undertaking of the Dundee Corporation is about 15,000 tons short. That amount includes the carry-forward balances for next year. In other words, the colliery companies have taken the actual quantity used and quoted on that basis. What an undertaking uses and what it might have actually to use are, of course, two different things. Mr. Wilson continues: "We have had no choice of coal this year. We take what we get. I have not taken everything I have got, however, because some of it was not suitable. While the quotas have been very much reduced, prices are up to a figure that, in my opinion, is totally unwarranted, but the coalmasters have autocratic powers under the Mines Act. What can you do except pay through the nose? In the coal trade at the moment it is a question of take it or leave it. In some cases I have asked for extra tonnage, and I have been told: 'Well, we can spare you a little extra, but you will have to pay a little more for the extra.'"

News in Brief

CURRENT EVENTS IN THE GAS INDUSTRY

A Grid Fault caused a complete failure shortly after a new electrical installation had been switched on at Radbrook Technical School, Shrewsbury.

Applications Are Invited for the position of Engineer and General Manager to the Exeter Gaslight and Coke Company at a commencing salary of £1,000 per annum, rising by annual increments of £50 to £1,200 per annum. Further particulars will be found in our advertisement columns.

The Two Oxen to be roasted at Leicester Coronation festivities may be cooked one by gas and one by electricity, if the Corporation Departments concerned see their way to setting up the necessary equipment. If they do, it is believed it will be the first time oxen have been roasted whole other than by coal fires.

The Increased Output of the Accrington District Gas and Water Board, stated Mr. A. J. Harrison, Manager of the Board, at the monthly meeting, constituted a record during the year. The increase was 36 million cu.ft. The returns from the showroom showed that a total of 2,476 cooking and heating appliances had been sold.

For Further Gas Mains Extensions the Coventry City Council require £120,000 in consequence of the increasing demand for supplies. It has been decided to apply to the Ministry of Health for sanction to borrow that amount. During the past three years extensions to Coventry gas mains have been carried out at a cost of £127,000.

Cookery Demonstrations were held from April 12 to 16 by Messrs. Falk, Stadelmann & Co., Ltd., in the showrooms of the Wolverhampton Gas Company. Both their "Newhome" and "Bakerloo" cookers were used for the demonstrations, which were given by Miss Deakin, of Messrs. Falk, Stadelmann. The attendances totalled 372, and we understand the audiences were highly appreciative of this joint effort.

To Celebrate the Coronation the Stanton Ironworks Company, Ltd., near Nottingham, have placed in the hands of trustees representing their 14,000 employees a fund to be provided by annual instalments which they guarantee will produce a revenue of not less than £350 per annum, to be devoted at the discretion of a Committee representing their employees for purposes of general benevolence not covered by existing works relief funds.

For Sale by Tender the Directors of the Bilston Gas Light and Coke Company offer such a number of £5 "B" shares as will with premiums realize a sum of £35,000. The shares rank for a standard dividend of 7%, subject to the sliding scale, and equally with similar shares now receiving a dividend of 9% per annum. The minimum price of issue is £8 per share, yielding at that price £5 12s. 6d.%. Tenders must be received before 11 a.m. on Monday, May 10.

Consequent Upon the Retirement of Mr. J. W. Sturdy, Managing Director of the Easingwold Gas Light and Coke Company, the undertaking is now under the control of Mr. H. E. Bloor, Managing Director, Engineer, and Secretary, York Gas Company, as a Constituent Company of the United Kingdom Gas Corporation. All matters relating to the Easingwold Undertaking should now be addressed to Mr. Bloor, Director, The Easingwold Gas Light and Coke Company, Gas Offices, Davygate, York.

The Following Dividends will be recommended by the Directors of the Montevideo Gas and Dry Dock Company at the Ordinary General Meeting on May 25: (1) Final dividend of 1½%, free of income-tax, for the year ended Dec. 31, 1935, payable on June 1, 1937, making, with the interim dividend of 1½% paid on Dec. 1, 1936, 3%, free of tax, for that year. (2) Dividend of 4%, free of income-tax, for the year ended Dec. 31, 1936, payable as to 3% on June 1, 1937, and the balance when funds will permit.

A Shortage of Copper Coinage in Belfast is attributed to the imprisonment of pence in gas meters, of which there are 60,000 in that City. Normally about £1,000 is collected daily in coppers by the Gas Department. Last week, however, the collectors were engaged on other duties, and the fact that the collections were not made as usual resulted in the shortage. "Our experience is that from time to time there is a shortage of copper coin," said a bank official, "but the position rectifies itself when the coppers are released from the gas meters."

Two Recent Technical Publications by the International Tin Research and Development Council have been published. The first of these (A.52) deals with tinplate production by electro-deposition. Problems in this connection are discussed by D. J. Macnaughtan, W. H. Tait, and S. Baier, under the title "Electro-deposition and Polishing of Thin Coatings on Steel." The second publication (B.3) deals with tin in refrigerating equipment. The Authors of this Paper are E. J. Daniels, M.Sc., and D. J. Macnaughtan. Copies of these Papers may be obtained free of charge from the International Tin Research and Development Council, Manfield House, 378, Strand, W.C. 2.

Early Days at Liverpool are recalled by the offer for sale of Alexandra Buildings, Liverpool, which hold some historical interest for the Gas Industry, for it was on the site of these buildings that the first plant for supplying Liverpool with gas was erected. The site was occupied at the beginning of last century by the coach-building premises of Jonathan Varty, who, in 1815, endeavoured to form a gas company in Liverpool with a capital of £15,000; but with difficulty Varty raised only £80. Undaunted, however, he erected a small gas-works at his Dale Street premises and obtained the Council's permission to lay a main to the Town Hall, where two three-light lamps were fixed. These lamps were first lighted on Jan. 23, 1816, despite an intimation from the insurance company that Mr. Varty's fire policy would be vitiated the moment the lamps were illuminated!

Amalgamation and Grouping

Stellite, Ltd., and Llandudno.

Negotiations for the sale of the Llandudno Gas Undertaking to the Stellite Company have been satisfactorily completed. It will be recalled that some time ago the Council approved in principle of the sale and empowered three Councillors to form a sub-committee to act. The draft agreement now remains to be approved by the Town Council. It is understood there is a prospect of a considerable reduction in gas charges.

The Stellite Company, whose works are at Queen's Ferry, Chester, now own the gas undertakings at Connah's Quay (30·5 million cu.ft. per annum make), Hawarden, Mold (19·8 million cu.ft.), and Conway (52 million cu.ft.). The annual make at Llandudno is 150 million cu.ft.

Canadian Gas Association

Change of Address

The Canadian Gas Association announces that all mail matter intended for the Association or for the Secretary, Mr. G. W. Allen, should now be addressed to the new office, 7, Astley Avenue, Toronto, 5, Ontario.

Relief of Rates and Gas Charges

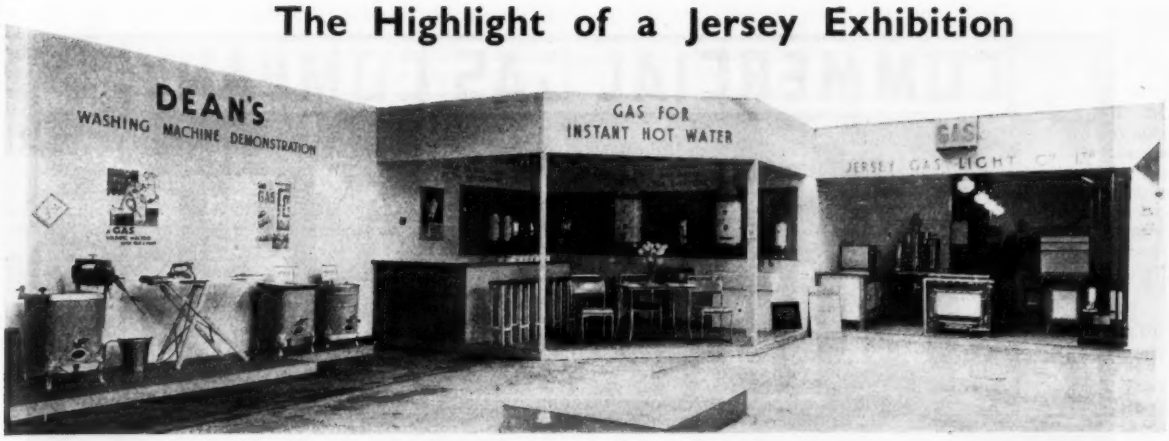
Despite Burden, Rochdale Forges Ahead

Up to 1925 the Rochdale Gas Department had contributed £513,603 to the relief of rates. Attention to this fact was drawn by Councillor A. Ashworth, J.P., Chairman of the Rochdale Gas Committee, at a meeting a few days ago.

If this sum had been applied to the repayment of the loans the whole of the money borrowed since the Corporation took over the Undertaking would have been repaid and gas could have been sold at 8d. per 1,000 cu.ft. less than the present price. He did not think it was good business to devote all the profits to rate relief, and as a result of this policy in the past the Department was now at a disadvantage. In addition to contributing so much to the relief of rates, the Department also supplied gas for street lighting free of cost for 20 years, up to 1906, which cost another £100,000.

In spite of intensive competition, however, the amount of gas sold during 1936 showed an increase of 3½% on the previous year's output, and he was glad to say that this increase had been maintained.

The Highlight of a Jersey Exhibition



The all-gas hall at the Jersey Trades and Industries Exhibition held at Springfield from April 8 to 17 was described in the local Press as the highlight of the exhibition. Our photographs show some of the attractive features incorporated in the exhibit staged by the Jersey Gas Light Company which included a cinema erected in the hall with an entrance through the centre of the Company's stand. A stage and operating box were erected in this cinema and plush tip-up seats were installed. Although the seating accommodation was only 70, 6,419 people saw the films during the course of the exhibition, it being necessary to have an almost continuous programme from 2 p.m. to 11 p.m. daily. Interspersed with the films were cookery demonstrations by Miss Fitzgerald, of Radiation Ltd., and announcements of the Essay Competition, special cash discount for cookers purchased during the exhibition, and invitations to the audience to have a cup of tea in the hall, &c. Mr. R. A. Fuller, Secretary and Accountant, whom we thank for these details, acted as *compère*. Direct sales of appliances at the exhibition far exceeded expectations and numerous good enquiries were received and will doubtless lead to further business. The Jersey Gas Light Company are to be congratulated upon their enterprise in organizing this noteworthy effort, which should do much to stimulate the use of gas on the island.

The Royal Fusiliers

Re-Union Celebration of the Coronation

Colonel W. R. Glover, D.S.O., T.D., C.M.G., has invited our attention to a notice which is appearing in the daily Press, but which may perhaps have failed to catch the eye of some of our readers who would be interested.

A Regimental Re-union on a larger scale than has ever before been attempted is being organized by the Royal Fusiliers (one of the oldest Regiments in the British Army) as a part of the Coronation Celebrations. This will take the form of a "Coronation Dance" which will be held at the Palais de Danse, Hammersmith, on Thursday, June 3, 1937. It is hoped that there will be a record attendance of Royal Fusiliers, both serving and retired, and it is pointed out that any man who is serving, or has served at any time in the Regular or Service Battalions of the Regiment, the 1st, 2nd, 3rd, 4th City of London Regiments, or the 1st Cadet Battalion (Royal Fusiliers) is eligible to apply for tickets for himself and his friends. (During the War, the Corps of Royal Fusiliers expanded to 64 Battalions and approximately 235,476 men passed through its ranks. To-day there are two Regular and three Territorial Battalions, and the 1st Cadet Battalion, Royal Fusiliers is affiliated to the Regiment.)

Particulars of the Re-union can be obtained from the following:

Hon. Secretary, Regimental Office, Depôt Royal Fusiliers, Hounslow. Telephone—Hounslow 0995.

O.C. 1st City of London Regiment, Royal Fusiliers (T.A.), Handel Street, Bloomsbury, W.C. 1. Terminus 3704.

O.C. 2nd City of London Regiment, Royal Fusiliers (T.A.), 213, High Road, Balham. Streatham 7888.

O.C. 3rd City of London Regiment, Royal Fusiliers (T.A.), 209, Harrow Road, Paddington. Abercorn 2319.

O.C. 1st Cadet Battalion Royal Fusiliers, 25 Pond Street, Hampstead.

Major T. H. Bisgood, M.M., J.P., Lampton Hall, Heston.

Dress will be optional. Dancing from 8 p.m. to 1 a.m. and the price of tickets is 2s. 6d. single and 5s. double. The floor of the Palais de Danse is one of the finest in England, and two bands will be in attendance throughout the evening. There will also be a cabaret at 11.30 p.m.

South-Western Gas and Water Corporation, Ltd.

Dividend Announcement

The Directors of the South-Western Gas and Water Corporation, Ltd., are recommending a final dividend of 3% (less tax) on the ordinary shares, making 5% for the year ended March 31, 1937. The dividend is payable on May 22.

"Willing's Press Guide"*

1937 Edition

As in previous years it is with a confidence based on a knowledge of the ungrudging effort and care devoted to the preparation of *Willing's Press Guide* that the publishers present their 1937 edition. This year marks the presentation of the sixty-fourth annual issue.

One is not surprised by the growing demand experienced each year. Few publications contribute so much to the alleviation of the work of those who constantly require the essential and accurate information which *Willing's Press Guide* has in full measure. A net sales certificate has been issued for the 1936 Edition, showing that 5,028 copies were sold. Despite this large sale many orders were received after the exhaustion of supplies to the disappointment of intending purchasers. Once again this year the print order has been substantially increased, and we share the publishers' anticipation of a new record sale. There has been a large addition to the list of newspapers and periodicals. In the section headed Recent Titular Changes and Amalgamations there are many noteworthy entries.

* London: Willing Service, Willing House, 356–364, Gray's Inn Road, W.C. 1; price 2s. 6d.

New Gas Showrooms for East London

Roman Road—almost from time immemorial the site of one of London's most famous street markets—has taken on a new dignity by the erection there of fine new showroom premises for the Commercial Gas Company.

Right in the centre of one of Bow's busiest shopping areas, frequented at all hours of the day by teeming masses of jostling shoppers, the building's modern front stands out in the midst of the huddled ranks of stalls which leave barely room for a single line of traffic between them, adding a note of distinction and a definite centre of interest to a thoroughfare which echoes with the varied cries of countless stallholders and the ceaseless movement of East London housewives in search of their domestic needs. And at night, when the crowds grow denser still, the showroom, with its splendid façia lighting, becomes a focal point of brilliant illumination which draws the public to its windows to view, in contrast, perhaps, with its surroundings, the gleaming white enamel gas appliances and colourful displays tastefully set out within. This new showroom is illuminated till 11 o'clock each night as a striking testimony to the service which gas can render to the populace, and enormous interest has been aroused in the district during the short period the premises have been open. The Company are to be congratulated upon the choice of such a site for the erection of a gas showroom, and it seems that their enterprise is to be well rewarded by the amount of business which the premises are bringing in.

As will be seen from our photograph of the exterior, there are two main entrance doors flanked at either extremity by small corner windows, with a main centre window between them. The doors and centre window have been set back a few feet from the frontage line to allow of a "circulating" area from which the public may view the contents of the showroom without obstructing the pavement—a very wise provision in view of the crowded nature of the thoroughfare to which reference has been made. Level with the frontage line across the top of the windows the Company's name is carried upon a backing of frosted glass, which has the effect of emblazoning forth the name at night time by means of a series of strip lanterns fitted up behind, providing a very effective shop-front, which at the present time is attractively decorated with an excellent Coronation display.

Entering the main showroom one is immediately struck by the pleasing layout of the interior, which, though characteristically ambitious in conception, has been skilfully planned to avoid any tendency to being so lavish as to overawe the type of consumer for whom the premises essentially cater.

The soft rubber covered floor obviates undue noise of movement, while the walls are attractively panelled in satin walnut. Glass panels make an effective ceiling, which is broken farther back by a number of laylights illuminated from above by gas lamps fitted in glass ventilating chambers on the flat roof. A noteworthy feature of the showroom is the beautiful lighting, a variety of different designs of pendant fitting all being switch controlled in groups. If the showroom becomes too warm at night the pendant lights can be switched off and the lamps above the laylights turned on instead, these in themselves giving a very pleasing effect.

All down one side is a comprehensive display of cookers in enamel finishes, providing types and sizes for

TWO GLIMPSES OF THE NEW PREMISES.
On the left a general view of the interior of the main showroom; and above a close-up of the very fine gas water-heating display.

every taste, while on the opposite wall are different designs of gas fires, both built-in and independent, further examples being also grouped around the column in the centre of the showroom. All have automatic ignition and are connected up for demonstration purposes. A number of ventilating grills set high up on the walls assist in maintaining comfortable atmospheric conditions, while a beautiful coloured painting, executed on the same wood as the walls, makes an attractive centrepiece above a gas-ignited coke fire in modern setting. The gas fires stand upon continuous glass sheets covering a black base raised slightly above floor level, which sets them off to good effect.

Refrigerators are prominently displayed, as also are examples of the many smaller appliances which can be conveniently plugged-in to gas. In a farther corner of the showroom is the cash desk, close to which is a showcase containing samples of the different grades of domestic coke, while below the staircase leading to the first floor is a spacious cupboard for the storage of the small fittings, radiants, &c., which are in constant demand.

Perhaps the *pièce de resistance* of the main showroom is the fine water heating display arranged on the far wall. This is illustrated in one of the accompanying photographs. A series of six sink heaters and a multi-point machine are grouped in one setting on a polished black backboard; all are connected up for demonstration and discharge their hot water into a common stainless steel trough. The heaters are independently controlled so that they can be easily changed whenever desired, and the whole setting can be effectively floodlighted by concealed gas lamps set above glass panels over the display. Close to the water heaters is a demonstration café set. The whole premises are equipped with Nautilus flues, and the pleasant atmospheric conditions within are particularly noticeable.

Demonstration Room.

Immediately behind the main showroom, entered from doors on either side of the water heating display, is a fully equipped demonstration room, which is capable of accommodating up to 150 persons. A commodious platform is fitted up with two types of gas cooker, a refrigerator, and kitchen cabinet, while a section of one wall is occupied by large cupboards for the demonstrator's stocks; she also has at her disposal a small ante-room containing sink and water heater. The lighting of the demonstration room is particularly effective, plenty of natural light entering through "clerestory" windows opening on to the flat roof, while artificial illumination is provided by a series of switch-controlled pendant fittings in chromium plated finish. The whole of the centre of the floor of the demonstration room consists of wooden blocks, with verges of the same rubber material as the showroom. The heating is effected by luminous gas radiators of pleasing design.

Adjoining the demonstration room, and connected by a separate passageway from the showroom, is the stock room for storage of fittings and appliances, and next to this is a well-equipped little workshop for the permanent fitter attached to the depôt; he has his own cloakroom with wash basin supplied by an instantaneous water heater. Beyond this is a roomy garage opening out on to a side road. Company's vans can be backed conveniently into this garage for the unloading of appliances direct to the stock room, thus obviating the necessity for bringing apparatus through the showroom.

On the first floor, overlooking the street, is another showroom where a further range of fires and cookers is displayed; it is here proposed to arrange a modern ideal kitchenette with a view to showing the housewives of the district how bright, efficient, and economical the up-to-date all-gas kitchen can be.

Also on the first floor is the office of Mr. T. F. R. Comerford, the Showroom Manager, together with a comfortable rest room for the lady members of the showroom staff, both these rooms having their own cloakrooms, with basins and water heaters, and heated by gas fires or radiators.

We have not the slightest doubt that the new showroom will attract at least as much interest as the pawnbroking establishment which, we understand, previously embellished the site, and that the people of Bow will find in the new business at No. 266, Roman Road, E. 3, a service which will give them quite as good value for money as its predecessor!

THE JOINT COMMITTEE'S REPORT

ON

Gas Prices

We publish below the full text of the Report which was issued last week by the Joint Committee of the House of Lords and the House of Commons as a result of their recent investigations upon the subject of Gas Prices.

The Committee have met and have heard evidence, and considered the Memorandum submitted by the Board of Trade, the proposals of the London County Council and other local authorities, and the cases presented by Counsel on their behalf and on behalf of the South Metropolitan Gas Company and the National Gas Council.

1. The Order of Reference appointing the Committee reads as follows:

> "That it is expedient that a Joint Committee of Lords and Commons be appointed to enquire into the powers of regulating charges possessed by the South Metropolitan Gas Company and other gas companies authorized to operate under a basic price and basic dividend system, to consider whether adequate protection is afforded to the interests of the different classes of gas consumers under such powers, and to report what action, if any, is necessary."

2. The issues, therefore, which the Committee have been called upon to decide are:

> (1) Does the Basic Price and Dividend system of itself and in all circumstances afford adequate protection to the consumer of gas?
>
> (2) If adequate protection is not afforded by the Basic Price system, is further protection required?, and
>
> (3) If so, what form should it take?

3. The Committee were appointed as a result of protests which in September, 1936, were brought to a head by an appeal from the London County Council to the Government against a tariff which the South Metropolitan Gas Company substituted, at four days' notice, for the flat rate previously paid by their ordinary consumers. The South Metropolitan Company gave the ordinary consumer no option; he had either to accept the tariff or cease to use gas.

The South Metropolitan Company adopted a tariff only after long and careful enquiry, with the object of distributing the burden fairly between the various users of gas, and they recommended their "tariff" scheme as a great benefit to their customers and a means of reducing the price of gas.

Their testimony before the Committee was directed to show that, on balance, their small consumers would have saved money by using gas alone for heating and cooking as well as for lighting, in lieu of electricity, coal, or oil.

But to change habits and preferences is difficult and requires both time and tact, and in the opinion of the Committee, it is not surprising that many small consumers failed to appreciate the advantages of the new scheme so suddenly thrust upon them.

4. To a prepayment meter consumer of less than ten therms per month the tariff with a fresh scale of meter charges increased the cost of gas by 33⅓% or 2s. 11d. per month; it would have been necessary for each of these small consumers to double his consumption of gas per month before the tariff reduced the price he paid per therm. To any such consumer who burned more than twenty-one therms per month—a figure reached by many poor households—the tariff gave an increasing advantage as his consumption rose.

The Committee had evidence of working-class families of small means burning more than 22 therms per month who agreed that they saved money by concentrating on gas and that the tariff helped them, but apparently 50% of the South Metropolitan consumers burn less, on the average, than 10 therms per month.

Thus the South Metropolitan Company attempted to

effect in four days a change which obviously required far more forethought and preparation.

Flat Rate Inequitable.

The Committee accept the evidence of the South Metropolitan Company that a flat rate is inequitable, as supplying gas too cheaply to small consumers who may have ample means at the expense of larger consumers who may be poor, but who use the more gas in their homes for heat and lighting; that it is necessary to adopt a tariff in order to compete for the custom of large consumers; and that only by spreading the fixed charges over a larger supply is it possible to cheapen the price of gas to all classes of small consumers.

5. At the same time the Committee consider that the South Metropolitan Company made a mistake when they abruptly raised the price of gas to the small consumer, and that mistake set in motion the present enquiry.

6. Such a mistake as was made by the South Metropolitan Company could never be prevented by the Basic Price system, for the South Metropolitan Company only fractionally increased the all-round average charge for their gas; they increased the charge for the smallest supplies and cheapened supplies of over 22 therms per month, thus maintaining the average price but relieving their better customers from the unfair burden of paying too much in order that minimum consumers should pay too little. It must be remembered that the minimum consumers are by no means always poor nor are poor households always minimum consumers.

7. Although the intention of the South Metropolitan Company accords with the practice of electrical and water companies who make a minimum charge to consumers of an uneconomic minimum, the Committee, without expressing any opinion about the general justice of the new tariff, consider that the South Metropolitan Company put themselves in the wrong by not giving their consumers time either to realize what advantages the new system might give them, or to make alternative arrangements if they rejected the tariff with its promise of economy as a reward for better custom.

Two facts are worth noting; first, that in all these years during which the Basic Price system has been gradually extended until to-day, when it regulates half our gas supply, this is the first occasion on which public opinion has been seriously roused against a gas company and secondly, that on this mistake being made, public opinion made itself heard forcibly and at once.

Public Opinion and Competition.

The South Metropolitan Company were checked not by the Basic Price system but by public opinion. Indeed, under the Basic Price system any company which chooses to raise its price unreasonably to one section of its consumers can in theory escape all control by reducing its price to another section, and thus maintaining the same average price.

There are two effective safeguards against excessive or unreasonable charges—public opinion and competition.

Taking a long view, competition will more and more protect the public from overcharge and it is chiefly to avoid similar errors of business tact in the future that the Committee recommend the new precautions which will be found in paragraph 18 of this Report.

It is not necessary to repeat in detail the story of the dispute between the South Metropolitan Company and their customers or the history of the Gas Industry, both of which are to be found in the memorandum by the Board of Trade of the Evidence of Dec. 15, and in the opening speech of Sir Lynden Macassey, Counsel for the London County Council, of the Evidence of Feb. 9.

It is worthy of note, however, that since 1810 the Gas Industry has passed from competition to monopoly, and then again back to competition. From 1810 to 1847 it was controlled by competition alone; from 1847 to 1860 by maximum prices and competition. About 1860 rivalry between gas companies became expensive and inconvenient and from 1860 to 1875 each gas company had a monopoly in its own district, controlled by a maximum price. A coal famine in 1872 upset the maximum price system and from 1876 the "Sliding Scale" system controlled the Industry to the general advantage, until 1914 when conditions brought about by war made it unworkable chiefly because the increase in working costs so forced down dividends that, when most needed, additional capital was no longer attracted by the Gas Industry.

In 1920 the Basic Price and Dividend system was sanctioned by Parliament for the South Metropolitan Gas Company, and subsequently for a number of other undertakings, and now controls all the gas companies supplying London and more than half of those supplying the United Kingdom. In 1928 this system was challenged by the Board of Trade when the South Suburban Gas Company and the Dover Gas Company promoted bills to incorporate this system. The Joint Committee, however, over which Lord Chalmers presided, allowed both these bills to proceed, and in consequence the system was adopted in other cases without opposition.

8. The principle upon which the Basic Price and Dividend system works is set out in paragraph 7 of the Report of the Joint Committee on Gas Undertakings (Basic Prices) of 1932, as follows:

> "7. Subject to variations of detail in individual cases, the Basic Price system works as follows. A certain rate of dividend (hitherto usually 5%) is declared to be authorized for the ordinary stock of a company; and this is treated as a minimum, payable in any event so long as profits are available for the purpose. For the gas supplied, a basic price per therm is declared. When, as the result of a year's (or half-year's) working, it is found that the consumers have in fact paid less than what they would have paid by a uniform application of the basic price, the difference is treated as their benefit or the 'consumer's share.' Of that amount, a certain fraction* (usually one-sixth) may then be used to augment the authorized rate of dividend. An equivalent fraction has in all cases hitherto been assigned for the benefit of the employees."

9. Until it was found unsuited to changing circumstances each of the systems referred to in paragraph 7 was acclaimed as the perfect and ultimate formula for providing the public with the great boon of light and heat from gas without exposing them to excessive charge by the gas companies. At first competition was expected to do all that was necessary, then competition controlled by maximum price, then the change from competition to monopoly controlled by maximum price came as obvious economy, then the "Sliding Scale" seemed the conclusive answer to the whole problem, and finally the Basic Price system retained the control over excessive profits and restored the necessary freedom of action to the Industry. Now the wheel has turned full circle from competition through monopoly back to competition, and if the basic price ceases to control the dividends of some companies it is because a more drastic control than was ever contemplated by the Basic Price system is exercised by competition.

Effective Monopoly of Gas Ended.

Since 1860 each gas company has enjoyed a monopoly in the supply of gas in its own district, but now and increasingly it must compete with other heating and lighting agents. The effective monopoly of gas has ended, and with it both the risk that the companies will make excessive profits and the protection afforded by the Basic Price system against excessive dividends have been reduced. The Basic Price system controlled not the price of gas, nor the profit, nor even directly the dividend. It controlled the authority to pay a dividend, and as the average sale price of gas rose, this authority was reduced and *vice versa*. As the gas companies are now forced by competition to sell more gas for less money, their authority under the "Basic Price" system to pay dividends sometimes exceeds the realized profit available for dividend payment, and by so large an amount that even if the Basic Price system reduced the authority to pay a dividend, the actual distribution need not be reduced. In effect the protection against overcharge which was afforded by the Basic Price system is now given by competition.

10. From this short summary it is clear that one plan or formula after another has been tried, acclaimed as perfect and permanent, and found in time too rigid to adapt itself to change.

The Committee are of opinion that no new formula is needed, or indeed can be found, which would give the necessary freedom to the Gas Industry to meet competition and at the same time provide absolute and lasting protection to all classes of consumers.

11. The Basic Price system does not cramp the Industry and in general affords protection, and it is the Committee's view that it should be continued.

There remains the question whether the Basic Price system, together with competition and public opinion, will protect all consumers in all circumstances, or whether further protection is required, and if so what it should be.

The houses and streets in which electric light does not compete with gas are rapidly decreasing, and even when a large district (as, for example, 20% of Newcastle) has no electric light, the price of gas in that district of partial monopoly for lighting is controlled by the competition of electricity in other districts of the same town, because the same prices must be charged for gas over both areas.

The suggestion that electricity does not compete for the

* One-eighth is the fraction allowed by the South Metropolitan Company's Act of 1920.

custom of poor working-class districts seems remote from the facts. To give one example, in West Ham the number of electric cookers rose from 145 to 8,365 in the last nine years.

12. As this enquiry originated from a Metropolitan protest much of the evidence concerned London, but the Committee was charged to report on the Basic Price system not in London only but in the United Kingdom as a whole. Conditions and the policy and prospects of various gas companies differ widely. Everywhere the gas company competes with coal, coke, and oil, and almost everywhere with electricity; to give one example of local variation, about 11% of the gas supplied by the South Metropolitan Company is used by industry, whereas in Sheffield in 1936, industry used no less than 70% of the total supply.

The gas companies of London are compelled to import coal, their raw material, hundreds of miles, whereas the Sheffield Gas Company buys coke oven gas in bulk and refines it, and is thus enabled to capture industrial custom by selling refined gas at prices far below those possible in London.

Any attempt to control by one formula or by rigid regulation, branches of the same industry which differ in such important points must, in the opinion of the Committee, hamper the Industry, and therefore damage not only its shareholders but also its customers and the coal miners whom it employs.

As between the competitors for public custom in the supply of light and heat there is no justification on grounds of public policy for laying a special handicap on gas. Oil, one of the competitors, must be imported and paid for by exports of British manufacture which may increase the difficulties of foreign exchange and domestic employment, while reliance on oil as a source of light and heat will increase the volume of essential supply to be imported in time of war. If, therefore, a choice must be made between gas and oil, gas ought not to be handicapped in the competition.

Economic Advantages of Gas.

14. Electricity and gas both employ British miners for their raw material. As between these two, witnesses claimed for gas a great advantage in economy.

> "In converting coal to electricity only 25% of the energy in the coal ever reaches the consumer . . . by the carbonization of coal (for gas) we conserve about 75% of the energy of the original coal, 50% of that energy is to be found in the coke, 25% in the gas."

15. The Committee were also told that if gas were no longer required for itself it would still be produced as the by-product of what are now the by-products of gas; for example, the Gas Light and Coke Company (which though the largest gas company, yet produces only one-sixth of the gas supplied in the United Kingdom)—"produced in the war TNT and other explosives sufficient to fill 160 million shells besides 70 million gallons of fuel oils and a very large quantity of disinfectants and supplied enough tar to tar the whole of the roads on the Western front."

16. The Committee do not suggest that the Government should intervene to support the Gas Industry in its competition with the electric industry, but it is, they suggest, contrary to public interest to lay burdens on gas to which electricity is not subject, or even to permit gas as the older of two competitors to suffer any longer than is necessary from adhesions of restraint because of a monopoly which it once enjoyed but has lost. Gas, for example, as a monopolist was compelled, and being no longer a monopolist is still compelled, to supply anyone within a certain distance of a gas main without insisting that the customer shall consume enough gas to pay for the service or shall pay a fixed minimum charge. Such unremunerative customers may be well-to-do people who use a gas ring to make a cup of tea and whose custom may not pay for the cost of reading their meter. The burden they throw on the company falls unfairly on other customers. Electric supply companies are free to refuse unremunerative custom and to insist on a minimum charge, but when the Gas Industry "with the united voice of all interests" including, as we were assured by Counsel for the London County Council "representatives of Municipal authorities, organized labour, the Board of Trade, and the Ministry of Health," asked for liberty to insist on a minimum charge, their request was rejected by Dr. Burgin, Parliamentary Secretary to the Board of Trade, on grounds which are understandable, but which should, the Committee think, now be reconsidered.

> "If we could start fairly," said Dr. Burgin, "I think it would not be unreasonable" . . . "to permit gas to insist on a minimum charge" . . . "but it is a very different thing laying down a quarterly minimum charge before supply begins and seeking to impose it when there is an ingrained habit extending over generations of being able to secure gas on a prepayment meter" . . . "I am not attempting to justify the exclusion of the minimum charge from the bill on any ground of logic or technicality. I am doing it entirely on the political argument that the Government are not prepared to face the opposition that would necessarily come from people in scattered places amounting to millions in total who would never understand the reasons behind a clause of this kind."

17. This reason so frankly stated by Dr. Burgin has great force against a capricious or abrupt alteration of the charge for gas. Gas has by its very virtues assumed an obligation which it must not suddenly cast off; it has in the past been indispensable, and to many customers it may appear still to be indispensable. On the other hand, the demand of gas undertakers for the right to refuse supply unless the customer will pay the cost of service is not novel, nor should it be hard to understand.

The public do not expect to be supplied with electricity or water or coal for less than the cost of service.

If the occupant of an expensive flat wants a gas ring, he can afford a minimum charge. If the poor householder wants gas, he can obtain it at a cheap rate by using gas not for one but for several purposes, but he should be given time either to understand and accept the terms on which gas is offered or to supply himself with light and heat in another form.

Recommendations.

18. The Committee therefore recommend—

(1) That the Basic Price and Dividend System should be retained, but that power should be granted to the Board of Trade from time to time, and at any time, on the application of a local authority or a gas company to revise the basic price of any gas undertaking in accordance with the provisions of Section 1, sub-section (3) of the Gas Regulation Act, 1920, as amended by any Public General Act.

(2) That undertakers should be required to publish particulars of the "ordinary" price at which they are prepared to supply gas in accordance with their statutory obligations.

(3) That undertakers should be authorized by general legislation to impose a special charge on consumers whose premises remain connected to the undertakers' mains for "stand-by" purposes only. They should also be authorized to impose minimum quarterly charges calculated on the basis of an assumed consumption of 10 therms per quarter, subject to a refund of the excess charge in any quarter of any year in which the consumption reaches 50 therms.

(4) That in regard to the recommendation in paragraph 68 (6) of the Second Interim Report of the Gas Legislation Committee of 1933, the principle of the Wrottesley Provision (which is to reduce the effect of bulk supplies upon the authority to pay dividend) should be adopted; the Committee consider, however, that it would be unwise to apply a uniform scale to all gas undertakings. Each undertaking should be considered separately and the scale fixed for the Wrottesley Provision should be appropriate to the business and prospects of the individual undertaking.

(5) That any gas undertaker wishing to increase his ordinary price by more than 12½% within any period of three years or to impose a minimum charge, shall be required to give notice of one month to the Board of Trade and to his customers, and not to proceed with his intention except with the sanction of the Board of Trade.

19. In the opinion of the Committee competition and public opinion within and without the Industry are the most effective checks on any unreasonable charge to the consumer.

The Committee also hold that if the National Gas Council, whose members produce 90% of the gas supplied in the United Kingdom, included all the dissident Companies, of whom the group consisting of the South Metropolitan Company, the Commercial Gas Company, and the South Suburban Company are effectively more than half, the common sense of the Industry as a whole would have force to prevent any clash with public opinion.

The Committee do not suggest that the National Gas Council should seek any statutory authority over its members but that those undertakers who have not adhered to the Council should consider seriously whether they would not serve the interests of their customers, their shareholders, and their colleagues in the Industry by joining to make the Gas Council both comprehensive and effective as a critic and adviser in advance, on any departure in tariff or policy by one undertaker, which may ultimately involve the whole Industry.

THE SOCIETY OF BRITISH GAS INDUSTRIES

THE PRESIDENT

Presidential Address

OF

The Most Hon. the MARQUESS OF LONDONDERRY, K.G.

Delivered at the Annual General Meeting of the Society held this afternoon at the May Fair Hotel, London.

It is my duty, as President for the year of the Society of British Gas Industries, to address the Annual Meeting in my official capacity. There would be no real object were I to traverse that wide field of industry which is covered by those companies which come under the heading of the British Gas Industries, and whose destinies are watched over by the Society over which I have the honour to preside.

On an occasion of this description there are so many subjects to which one would like to direct oneself that it is difficult to choose the one most appropriate for the occasion and the one to which my audience would care to listen. The trade of the country is a subject which interests us all, and we must look with satisfaction on the obvious increase in prosperity which has taken place in the recent past. We feel if this prosperity can continue and can extend its beneficent influences throughout all the countries of the world that the great problem of peace and war, which at the present time is primarily engaging the attention of all governments can be solved in an atmosphere which is much more conducive to that solution than the conditions through which industry has in so many cases been passing during the last few years.

I have no desire on this occasion to say anything of a very controversial character nor would I like to give vent to any expression which might be misunderstood, but I have always felt that the entry of what we call militant politics into the conduct of industry has always carried with it difficulties, and I might say sometimes disasters.

It is quite true to say that industrialists as a class when they think it necessary call upon the Government to come in and assist them through their difficulties. I somehow think that many industrialists in the past have not realized the implication of their action in appreciating that if the Government is called in to assist we find the old proverb in application " that he who pays the piper calls the tune," and this feature, in my judgment, has always characterized the policy of Protection.

It used to be said, I think with truth, that the Protectionists were far closer to Socialism than were the Free Traders, who believed that the trading difficulties of the world could be overcome more readily and more successfully by a maintenance of Free Trade. Many of us, like myself, can remember the controversies raging round what was called Tariff Reform *versus* Free Trade. The majority of Tariff Reformers believed implicitly that Protection should be established, but the larger number of people throughout this country, and I believe throughout the Dominions, were of the opinion that a midway course would bring about the solution which we were all so desirous of seeing. However, the passage of events since then has shown us, I think, how inherently difficult it is to discover such a course.

Let us pause for a moment and examine this question of tariffs a little more closely. The Protectionist sees his countrymen, as he puts it, driven out of employment by floods of cheap foreign imports, and consequently demands that these imports be kept out by the imposition of import duties which jettison such commodities. Where the majority of the countries of the world are in a greater or less degree of this way of thinking, as they unfortunately appear to be to-day, friction between the nations must inevitably result. You will probably remember some years ago, I think it was very shortly before the advent to power of the National Government in 1931, the public outcry fostered by certain sections of the Press against the swamping of the English market with cheap wheat and cheap fruit from the Continent. We were told that if these imports were allowed to continue unchecked, the ruin of the English farmer would be complete. Yet viewed as a whole such importations as these merely constituted part of that abundance which the resources of modern industry can provide us with. Something is surely wrong with our economic mechanism if we are unable to distribute these products of Nature's bounty at home without ruining ourselves.

The case against Protection was, I think, very well put by the French economist Bastiat who, writing in the 'forties of the last century, drew an analogy between the modern industrial community and Robinson Crusoe and Friday on their island. Crusoe and Friday are working hard cutting up a tree into planks, when some planks from a wrecked ship are cast up on the shore. Their first impulse is to take them and use them; but on reflection they realize that if they do this there will be less work for them to do—that is, they will be throwing themselves out of employment. Therefore they push the planks back into the sea. Now that is exactly what the Protectionist does, instead of distributing the abundance which the foreigner is willing to sell cheaply, and using the labour saved to create more real wealth in the shape of those particular goods which for various reasons his country is in a position to produce more easily, the Protectionist keeps the abundance out so that the resultant scarcity compels his people to work harder to produce the same or a smaller return. Bastiat, and the group of economists known as the Manchester School, thought that Free Trade alone would make a prosperous world, since during the last century when they were propounding their views, Free Trade had the effect of making an exceedingly prosperous Britain. However, Bastiat's analogy was not quite correct. It is assumed that Robinson Crusoe and Friday were free to help themselves to everything they wanted and which the island could provide according to their individual needs. Unfortunately, the assumption does not hold good in a modern community. Indeed, it might not have been so in the hypothetical desert island. Let us suppose that Crusoe, whom we may liken to a modern industrialist, is regarded as the owner of the island, and Friday as his employee. Suppose, too, that instead of pushing away the planks which were washed up, Crusoe proceeded to use them, and then told our friend Friday that he had no further need for his assistance and he must therefore go without his dinner. Friday is thus in precisely the same position as the worker in a " protected " industry whose factory is obliged to close down if there is a sudden reversion to Free Trade and the goods which it produces are allowed to be imported from abroad.

Free Trade, therefore, is not enough, although in my judgment it is *prima facie* an expedient of common-sense, since it approaches more nearly to conditions in the ideal world where all the nations would be able to share in the world's produce unhampered by any artificial restrictions. Something more than Free Trade is required, as we have

seen, but whatever it is that should supplement this economic policy we cannot escape from the reality that it must involve a certain measure of Government interference. The question therefore arises, how far should the Government come in? At what point does Government interference in trade and industry overstep the bounds of reason, and by sapping individuality and private enterprise, become disadvantageous to the community as a whole? These questions cannot be determined by any given set of political principles.

In the nineteenth century, which incidentally witnessed the greatest era of commercial prosperity which this country has hitherto enjoyed, Government interference was directed first in the interests of the labourers and artisans to prevent them, in the current phraseology, from being exploited by the industrialist employers, and later this interference was continued in the interests of the employers themselves to prevent them from being exploited and put out of business by the employers in other countries. A policy of Free Trade suited our pockets at first because in the race for commercial and industrial development we easily led the field. With the aid of such scientific discoveries as steam and machinery of which we were quick to take advantage we were enabled to turn out goods on a vast scale sufficient to satisfy the growing needs of other countries where industries were less developed than our own or not developed at all. In exchange for these manufactured goods we were able to import all the food we required to sustain our rapidly increasing population. Furthermore, this country had been saved from invasion which had been the lot of the majority of European countries in the era of the Napoleonic Wars, and consequently our activities were conducted under the best circumstances at the time in contradistinction to the difficulties which faced the rest of the civilized world.

Looked at from the monetary point of view we became under the banner of Free Trade the richest nation, and London became the financial centre of the world. Our exports were considerably in excess of our imports, and this gave us what the economists were wont to describe as "a favourable balance of trade." The difference in the shape of gold and foreign credits was, when translated into terms of money, in great part invested abroad. Hence, many foreign undertakings came to be controlled by British capital, while the profits yielded were frequently reinvested in other countries.

The harmony of the Free Trade gospel, which we professed, was first disturbed by the world-wide agricultural depression which set in during the late 'seventies of the last century. The agriculturalists thereupon declared that the depreciation in value of their produce, which had been going on steadily for some years and which had already ruined many of them, was due to Free Trade, and they clamoured for the introduction of a policy of Protection by their respective governments. Furthermore, many countries were beginning to manufacture on their own account commodities which they had hitherto been in the habit of importing from us, and it was only natural, perhaps, that they should foster their new industries by the imposition of tariffs. One by one the principal countries of the world became Protectionist, with the exception of ourselves who, in spite of the very vigorous Tariff Reform Campaign waged in the early years of the present century, preferred on the whole to remain faithful to the Cobdenite principles of our fathers.

But Protection in the countries which adopted it, though it might produce some temporary alleviation, was found to provide no real and final solution of the problems of poverty and unemployment from which they had been suffering under the *régime* of Free Trade. Meanwhile owing to diminishing markets abroad, we in this country began to be confronted with the same problems, gradually becoming more acute. Hence an outlet was sought in the policy of despair known as Socialism. But this provided no real solution either, since it was based on what was—at least to my mind—the false assumption that the poverty of the many was due to the selfishness and unscrupulousness of the successful few. Robbing Peter to pay Paul, which is what Socialism in essence amounts to, merely involves the transference of purchasing power from one section of the community to another. It does not increase the aggregate amount of purchasing power in the hands of the community as a whole, and in the long run both producer and consumer under Socialism are left as badly off as before.

And so we come to the years of the Great War. These years witnessed a marked return of prosperity for most countries whether belligerent or neutral, since their industries were turned to the production of war materials and so found a ready outlet for their products which were rapidly consumed. The results of the world-wide conflict were not so fortunate. Besides the appalling and needless wastage of human life and material which it occasioned, the war produced an intensely nationalist spirit throughout the world. Each country retired within its own borders, each country was desirous of seeking a measure of self-sufficiency and fending for itself in an insecure world. Meanwhile hard-headed financiers clamoured for the extraction of the uttermost farthing from the defeated enemy.

The follies and difficulties in the policy of war debts and reparations were amply shown when the United States of America, who had emerged from the contest as the chief creditor, refused to have the debts owing to her paid off in the only way in which the debtor countries could discharge their obligations—that is, by payment in goods. The seemingly insoluble problem, which confronted the Americans, was how were they to receive payment of what was lawfully due to them without throwing their own people out of employment? This problem baffled the ingenuity of the leading bankers, economists, politicians, and industrialists in America, and in the end they agreed to a virtually all-round policy of cancellation.

Again, owing to the efforts made by individual Governments to reduce unemployment within their countries by stimulating their exports, international trade has been landed in a similar *impasse*. Each country has been trying since the war, by every possible means, to develop its exports and keep out imports, and such a policy is bound to produce friction between the nations. For instance, we in this country have been endeavouring to increase our export trade to the Argentine, but at the same time we have put tariffs on wheat and meat, the only commodities with which the Argentine can pay us for the manufactured goods which we export to her.

It may fairly be said, I think, that the success and prosperity of mankind depend upon the general arrangements, undertakings, and adjustments, as well between nations as between individuals, which are secured with the least amount of friction. Now, as I have endeavoured to show, Protection is a system which develops the largest amount of friction in the long run. At the best, then, it is but a temporary expedient to be adopted by Governments as and when required.

In passing we must recognize the very salient fact that it is generally believed that the industrialist nation is superior to the agriculturalist one. This is true in the sense that the aggregate real wealth and producing power of the industrialist exceed that of the agriculturalist nation. But we must remember that the industrialist nation is dependent upon the agriculturalist for the food supplies which it cannot itself produce to feed its large population. For our own part, therefore, intrinsically what we should like is to be fed by our Dominions and Colonies with their agricultural produce in return for the manufactured articles with which we are in a position to furnish them.

The belief that the industrialist is superior to the agriculturalist nation sprang in some measure from the old doctrine of the "Trade Balance," a doctrine formulated by the economists in the last century who held the view that a big export trade was a sign of prosperity. This doctrine which, for the same reasons I have already outlined, suited us in the period of our commercial supremacy under Free Trade, has now become to a large extent illusory. Foreign trading by exports and imports is, after all, simply a means of exchanging what our own country produces for the products of other countries. If a country were able to produce all it needed at home, it would have no necessity to trade at all with its neighbours, and yet would be rich. No country can as yet do that, though some countries approach more closely than others to the goal of economic self-sufficiency. America, for instance, can produce a great deal of the commodities she requires within her own territory, and, in consequence, her foreign trade only amounts to £17 per head of population. Ireland, on the other hand, being badly equipped for industry except in the north-east corner, has to produce far more food than she needs in order to exchange it for coal and manufactured goods. Consequently her foreign trade amounts to £28 per head. She thus exports nearly twice as much in proportion to the total of her population as does America, but no one imagines that Ireland is on the whole richer and more prosperous than that country.

We are, therefore, forced to the conclusion that the so-called favourable trade balance assisted by a policy of Protection cannot in the long run ensure prosperity, and permanently decrease unemployment. Here we are once more confronted by the old problem of mechanization and the limits which it sets upon manual labour. Every mechanical device, and every method of industrial reorganization effected to save time and labour throws workers out of employment. We are apt to overlook the fact, however, in our search for a solution to the problem, that mechanization also increases the general resources of the community, and the unemployment which it causes should not, properly speaking, be regarded as a sign of poverty and economic distress, as many economists are

inclined to do. Of course, we hope and strive after the idea that the manual labour displaced can be utilized in other directions, but I do not think that this can get rid of the problem, for unfortunately it appears that the labour is displaced more rapidly than it can be absorbed elsewhere. What, then, are we to do? Are we to abolish machinery, like the natives of "Erehwon" in Samuel Butler's book? Of course not. That would be a shameful sabotage of our economic resources. Yet we have already travelled a little distance along that road, for if it aims at reducing unemployment, our policy of tariffs, quotas, and embargoes also aims at restricting output.

Now, before the great scientific discoveries of the nineteenth century enabled us to harness the means of wealth to our assistance, the world was poor. To-day it is no longer poor, in the sense that the combined industry of mankind is not able to satisfy mankind's needs. The natural wealth of the world is enormous, while its potential wealth—that is, what it is capable of producing if called upon to do so—is beyond the powers of human calculation. A modern flour-mill can produce 30,000 barrels of flour per man per day; a modern shoe plant can produce 14 pairs of shoes per man per day. Here, then, is more than enough to feed and clothe mankind in adequacy and comfort, if not in luxury.

Not in these days is there any natural shortage of raw materials. In 1931, shortly before the economic "crisis" fell upon us in this country, we were told, as one newspaper put it (*Sunday Express*, Aug. 9, 1931), that the world had "too much of everything." There was a great glut of such commodities as wheat, sugar, tea, coffee, cotton, tin, copper, and rubber. We were told that we had more tea than we could drink, coffee was being burnt by the ton in Brazil, and we had enough wheat to last us for two years. Yet in the face of this abundance we were caught in an economic blizzard from which we have only lately begun to emerge. In this connection I should like to quote what Mr. H. G. Wells had to say on the glut to which I have referred. "We have all the stuff we could ask for," he said, "and more. But, on the other hand, there are swarms of under-paid or unemployed folk who cannot use up these things because they have no money. There is the stuff and they can't touch it. On the one hand, plentiful supply; on the other, urgent need—and a mysterious inability to bring them together. That's a fantastic paradox of work and business to-day."

Many of the economic ills from which we are suffering to-day can be traced, I do not doubt, to the faulty working of our monetary system. That system has certainly worked well in the past, but we should remember that it originated at a time when the public demand for goods was greater than the supply, and when competition between individuals was inevitable. Unemployment was not then a problem. It only became so, as I have already suggested, when machinery began to set limits upon the requirements of manual labour. At the same time the supply of the world's goods has come to exceed the demand, and the spirit of competition is giving way to that of co-operative industry and trade. It would appear now that our monetary system must eventually come into line with these developments if the needs of the modern community are to be fully satisfied. That is a matter primarily for the attention of our bankers and financiers, and it seems that the time is coming when they must set their house in order.

This excess of supply over demand, or overproduction as we commonly call it, with its accompanying unemployment, has given rise to various attempted solutions of the problem, some of which I have already mentioned. They include tariffs, quotas, embargoes, and other methods of restricting output—even to the extent of the destruction of the goods themselves. This "sabotaging" of our assets, if I may use a word which has recently entered our vocabulary, also embraces the human element, for it is reflected in the steady decline of our birth-rate and the popular advocacy of contraception which has been going on since the War. Our national art, science, and education have also suffered, not to mention the general physique and health of the people, all of which have become stunted and underdeveloped in many directions. And then, as if we had not enough troubles there appear cutting across the political field the dark clouds of international animosity and War.

Now in the achievement of that Utopian civilization, after which we are all consciously or unconsciously striving, there are certain things which we do not want to see. We do not want war. We want, on the contrary, to get people's minds off the idea of war and on to that of peace. Nor do we want periodical slumps and booms. Is it right that we should be enjoying a sudden wave of prosperity because the Government has changed its policy in regard to armaments? Is it right, indeed, that the leading nations of the world should suddenly become more prosperous largely because their peoples are engaged in manufacturing lethal weapons for the purpose of destroying each other? Surely national prosperity should depend upon less misanthropic causes than this! Nor, again, do we want to throw up our hands in despair, and hand over everything to the State, for if we do this we are confronted with the insuperable difficulty of interpreting fully what the State represents.

What we do want to see, in the sphere of industry and trade, is each country producing to its fullest capacity, taking what it requires in the way of supplies from its neighbours, and at the same time having no unemployed—or, rather, no unemployment problem; for increasing leisure there will be, as increased mechanical efficiency gradually sets free mankind to devote itself more and more to the education and improvement of its spiritual nature. What we want is to look beyond the petty struggles and hatreds of the moment towards that higher life of the world which we wish to enjoy, with the aid of the manifold gifts which Nature and science have provided to enrich it, and to enjoy more and more abundantly.

Trade Notes

C.O.L. Intermittent Vertical Chambers.

The contract for an installation of C.O.L. intermittent vertical chambers for the Bridlington Gas Company has been received by Gas Chambers and Coke Ovens, Ltd., Westminster, S.W. 1.

The contract consists of a complete carbonizing plant involving twelve C.O.L. intermittent vertical chambers, each having a capacity of approximately 3¼ tons, retort house, coal handling and crushing plant, coke screening plant, and coal and coke storage.

Battery-Operated Neon Sign.

Our attention has been drawn to a neon sign, operated from the battery, which can be used as an advertising medium on any transport vehicle at a consumption of rather less than one-half of that of a headlamp. Gas undertakings which have no objection on principle to the employment of electrical gadgets might well find attractive applications of such a portable sign to their advertising schemes. Other uses for the sign readily suggest themselves—for instance, they might be used with advantage in window display or on service depôts, &c. The fact that these signs can be operated from a battery is made possible by the use of a new patented converter unit, details of which may be obtained from the Super Power Company, 81, North Side, Clapham Common, S.W. 4.

Holmes-Connersville Exhausters and Boosters.

A brochure has recently been published by Messrs. W. C. Holmes & Co., Ltd., Huddersfield, showing the progress made by Holmes-Connersville exhausters and boosters during the comparatively short time Messrs. Holmes have held the manufacturing rights. Letters reproduced in the brochure testify to the efficient and reliable performance of these machines, which is further confirmed, the firm state, by the number of repeat orders received.

Among the advantages claimed for the Holmes-Connersville machines are their low initial cost, low horse-power required for a given volume and pressure, less ground space required, volumetric efficiency is maintained irrespective of the age of the machine, no internal rubbing parts and hence no internal lubrication required, only parts requiring lubrication are bearings and gears, low maintenance charges, parts in contact can be inspected without dismantling the machine, all parts in contact with gas are cast iron, and they are designed to run for long periods without attention. Holmes-Connersville exhausters and boosters are designed for direct connecting to multi-cylinder gas engines (thus making them extremely suitable for installation in gasholder stations or at consumer's works where gas pressures higher than ordinary distribution pressures are required), electric motors (avoiding reduction gears), and steam engines of the totally enclosed type (giving cleanliness and maximum economy in steam consumption).

GLOVER-WEST VERTICALS INSTALLED

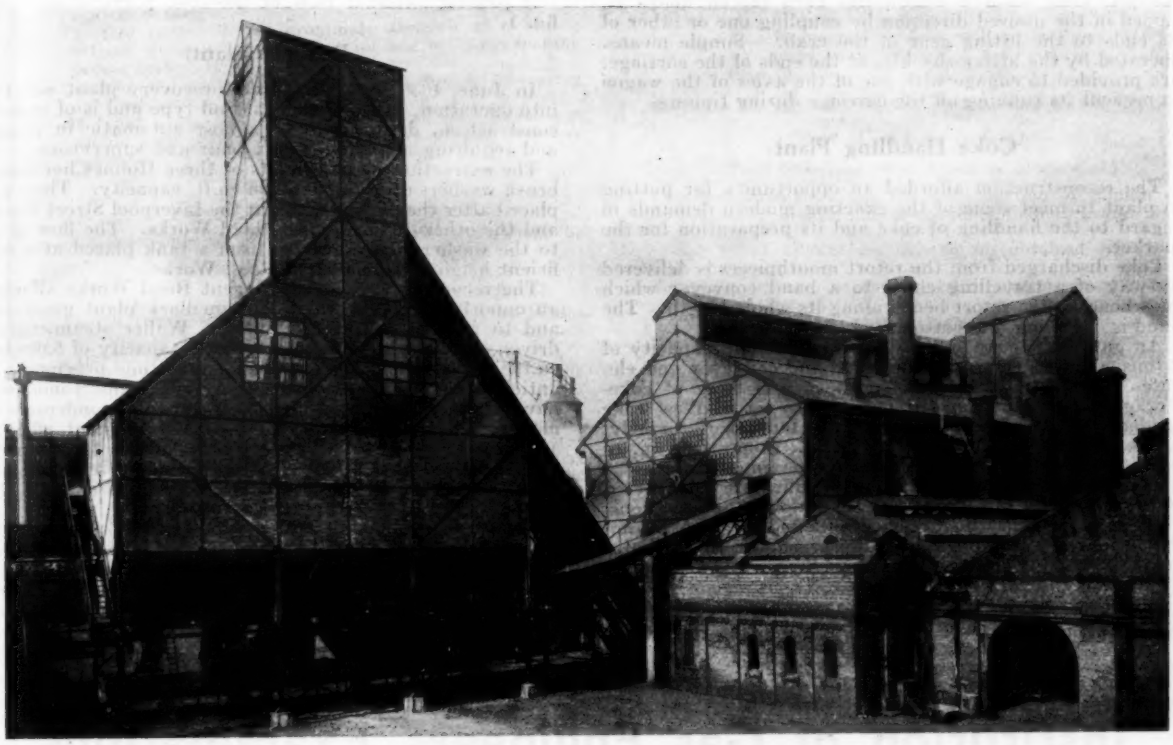


Fig. 1.—The Glover-West Retort House and Coke-Handling and Grading Plant at the Regent Road Works.

Early in 1936 an extensive scheme of modernization of the Salford Gas-Works was decided upon. The work was put in hand immediately and the new plant was in operation by the end of the year. The scheme comprised new carbonizing plant, a large plant for coke handling and storage, and new ancillary units.

in Modernization Scheme at Salford

The new carbonizing plant consists of fifty-six Glover-West continuous vertical retorts of the new model, arranged in seven settings of eight retorts, and capable of dealing with about 230 tons of coal per day. Five of the settings are built in the place of the original vertical retort plant, and the other two form a direct extension. Wherever the existing bench fittings were readily adaptable to the requirements of the modern plant, they were used in the reconstruction, and as few alterations as possible were made to the steelwork and supports for the bench.

The retorts at Salford are of the patent "Key" design, and the settings incorporate the latest improvements in detail, including the admission of the producer gas to the combustion chambers through graduated nostril plugs.

Each setting is served by a new built-in step-grate producer, equipped for the consumption of breeze. This equipment consists essentially of a West steam jet air injector, mounted in front of the producer above the clinkering door, a long port being incorporated in the lintel of the clinkering opening to distribute the indrawn air evenly to the grate. The now usual instruments are provided to measure the temperature of the air-steam mixture, and the pressures beneath the grate and in the producer-gas uptake. The West steam jet air injector is specially designed to reduce to the practical minimum the amount of steam used for the injection of air.

The waste-heat recovery plant comprises two Spencer-Bonecourt boilers, each capable of dealing with the waste gases from four of the seven settings, and of raising normally in such circumstances 7,500 lb. of steam per hour at a pressure of 120 lb. per sq. in. with 50° F. of superheat. The induced-draught fans on the boilers are driven by steam turbines, the whole of the heat in the exhaust steam being recovered by means of a feed-water heater.

Coal Handling Plant.

The coal bunkers, of sufficient capacity for 48 hours' supply to the whole of the retorts, are entirely new. The existing twin West gravity bucket conveyors have been raised and extended to serve them. The existing arrangement whereby the conveyors are supplied through two coal breakers situated in a pit at one end of the retort house, beneath the railway siding, remains unaltered. But for the discharge of railway wagons to the pit, there has been installed the simple but effective tipper illustrated in fig. 2.

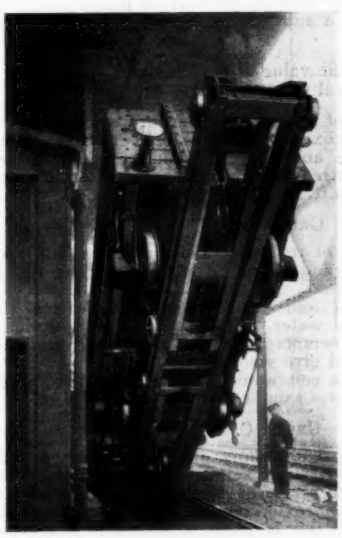


Fig. 2.—The simple but effective Tipping Gear Installed for the Discharge of Coal from Railway Wagons to the Breaker Pits of the Glover-West Plant.

It is necessary to tip wagons endwise in four positions, there being a separate receiving hopper for each of the two breakers, and two possible positions for the end door of a wagon approaching either hopper. The tipper consists of

an electric crab mounted on an overhead track, and beneath it a carriage running on rails between the railway track. The carriage can be moved to any position over the pit, and, when a wagon has been placed above it, tipped in the desired direction by coupling one or other of its ends to the lifting gear of the crab. Simple means, operated by the lifting shackles at the ends of the carriage, are provided to engage with one of the axles of the wagon to prevent its running off the carriage during tipping.

Coke Handling Plant.

The reconstruction afforded an opportunity for putting in plant to meet some of the exacting modern demands in regard to the handling of coke and its preparation for the market.

Coke discharged from the retort mouthpieces is delivered by way of a travelling chute to a band conveyor which runs beneath the retort bench along its whole length. The band is of rubber and cotton duck, 30 in. wide.

An automatic coke skip hoist, having a skip capacity of 2 tons, receives the coke from the band conveyor and elevates it to a receiving hopper above a battery of coke-storage hoppers. Thence it passes to a set of West coke graders, by which it is graded into four sizes—namely, Large, above 3 in.; Nuts, 2 in. to 3 in.; Domestic, 1 in. to 2 in.; and Breeze, below 1 in., at a maximum rate of 30 tons per hour. The storage hoppers, which are constructed of brick in steel framework, have a capacity of 250 tons. The compartments which receive nuts and large coke from the grader are equipped with spiral chutes to minimize breakage of the pieces by falling. Beneath the hoppers, the coke is discharged either into bags, by means of bag-filling chutes arranged on a platform suitably elevated for the loading of lorries, or directly into carts. The breeze is delivered through chutes to a small band conveyor, by which it is returned to the retort house to feed the producers.

A general external view of the coke plant is shown in fig. 1.

Benzole Plant.

In June, 1936, the new benzole recovery plant was put into operation. It is of the wash-oil type and is of modern construction, designed to be almost automatic in action, and requiring a minimum of labour and supervision.

The extraction plant consists of three Holmes horizontal brush washers each of 3,000,000 cu.ft. capacity. These are placed after the purifiers, two at the Liverpool Street Works and the other at the Regent Road Works. The flow of oil to the washers is by gravity from a tank placed at a sufficient height at the Regent Road Works.

The reconstruction at the Regent Road Works afforded an opportunity to overhaul the ancillary plant generally, and to replace obsolescent units. Waller steam-engine-driven exhausters, of an approximate capacity of 5,000,000 cu.ft. per day, had been installed some time previously in anticipation of the reconstruction. The old condensers have been replaced by Clapham water-tube condensers of modern design, which, with their compact and efficient appearance, stand in strange contrast with their ornate and towering predecessors. Improvements in detail are also being made where called for—as, for instance, in the means of operation of the existing purifiers.

As a result of the scheme of reconstruction and modernization which has been described, it can now be said that Salford, which entered the field of gas manufacture so early, possesses, at Regent Road, an up-to-date and efficient gas-works capable of meeting at all points the latest of modern demands.

Institution of Gas Engineers Examinations

The following questions were set for the Examinations in Gas Engineering and Gas Supply, which were held on April 24 and May 1 respectively.

GAS ENGINEERING.

ORDINARY GRADE.

2 p.m. to 5 p.m.

(Two questions only in each of the three Groups should be attempted.)

GROUP A.

1. Sketch and describe the construction of a modern retort setting with which you are familiar *AND* state the types of refractory materials used in the various parts.
2. What is the effect of a substantial increase in retort temperature on

   (*a*) the calorific value of coal gas and
   (*b*) its chemical composition?

3. Describe the method of operating a carburetted water gas plant *AND* state approximate working temperatures. What quantity of (*a*) coke and (*b*) oil would be required per 1,000 cu.ft. of carburetted water gas having a calorific value of 460 B.Th.U. per cu.ft.?

GROUP B.

4. Describe two methods of removing and quenching hot coke from a retort bench and state the advantages and disadvantages of each method.
5. Sketch a water-cooled foul gas condenser, indicating the positions of the gas, water, and condensate connections. State the outlet gas temperature to which you consider it desirable to work, and give your reasons.
6. Describe in detail how you would ascertain the percentage of free sulphur only in a sample of spent oxide of iron.

GROUP C.

7. Describe methods of (*a*) obtaining a representative sample (from 100 bags) of neutralized sulphate of ammonia and (*b*) ascertaining the percentage of ammonia in the sample. How many pounds (approximately) of sulphate of ammonia can be produced per ton of coal carbonized? State the class of coal from which you would expect this yield.
8. Describe how the crown may be supported when a gasholder is deflated.
9. Sketch any non-recording gas calorimeter approved by the Gas Referees *AND* describe the method of carrying out a calorific value test.

HIGHER GRADE.

PART I., 2 p.m. to 5 p.m.

(Two questions only in each of the two Groups should be attempted.)

GROUP A.

1. The yield of gas from a continuous vertical retort, expressed as "therms of gas per ton of coal carbonized," increases as the proportion of steam admitted and decomposed is increased.

   Discuss the various considerations which limit the extent to which "steaming" is carried out in normal practice.
2. Describe with the aid of sketches a setting of *either* horizontal *or* vertical retorts, showing the flow of producer gas, secondary air, and waste gases through the setting.

   Explain how any leakage of gas through the retort walls into the setting affects the composition of the waste gases, and how an analysis of the waste gases enables such leakage to be estimated.
3. (*a*) Considered separately, what would be the effect of making the following changes in the operating conditions of a carburetted water gas plant?
   (i.) A reduction in the depth of fuel bed in the generator.
   (ii.) The use of coke nuts of similar composition in place of large coke.
   (iii.) An increase in the duration of the "back run," accompanied by a corresponding reduction in the duration of the "up run."

   (*b*) A gas of a gross calorific value of 500 B.Th.U. per cu.ft. is produced in a carburetted water gas plant when two gallons of gas oil are used per 1,000 cu.ft. of total gas made.

   Calculate the percentage efficiency of gasification of the oil, assuming the following gross calorific values:

(i) Blue water gas	300	B.Th.U. per cu.ft.
(ii) Oil gas	1,633	" " "
(iii) Gas oil	150,000	" " gallon

GROUP B.

4. (*a*) What is meant by "the backward system of rotation" of oxide purifiers? Compare the merits of this and any other system of rotation with which you are familiar.
   (*b*) What conditions may cause an oxide purifier to offer an excessive resistance to the passage of gas through it?

5. (*a*) Describe the method of obtaining the proximate analysis of a sample of coal.
   (*b*) Give the proximate analysis of any gas coal with which you are familiar, naming the district from which the coal is obtained.
   (*c*) To what extent is the proximate analysis of a coal a reliable guide to its calorific value and to its gas making properties?
6. (*a*) Describe the construction and the method of operating an electrostatic de-tarring plant.
   (*b*) At what stage in the purification of crude coal gas should such plant be installed? Give reasons for your answer.

HIGHER GRADE.

PART II., 6 p.m. to 9 p.m.

(*Two questions only in each of the two Groups should be attempted.*)

GROUP A.

1. (*a*) Sketch crown trussing suitable for a two lift gasholder having an inner lift 120 ft. in diameter. Show how the trussing is attached to the holder.
   (*b*) What stresses must be taken into account in designing the trussing?
   (*c*) What materials would be used in constructing this trussing, and what should be their ultimate tensile strength?
2. Describe the construction and action of a retort house governor of any type which employs power from an external source for its operation (*i.e.*, a governor of the relay type).
3. Set out briefly the items to which regular attention should be given throughout the year in the operation of a horizontal multi-tubular waste heat boiler with mechanically induced draught. State at what intervals each duty should be performed.

GROUP B.

4. What quantity of crude benzole per ton of coal carbonized in horizontal retorts do you consider it possible to obtain by means of oil washing?
   What effect would such extraction have upon the calorific value of the gas and upon the yield of gas available for sale per ton of coal carbonized?
   What other changes would such extraction produce in the physical properties and chemical composition of the gas?
   If the quantity of wash oil were reduced to such an extent that the yield of crude benzole were halved, what changes would you expect to find in the crude benzole itself?
5. Distinguish between "free" and "fixed" ammonia. Of what practical importance is this distinction in gas-works practice and in by-product recovery?
6. (*a*) What do you understand by the terms "thermal efficiency" and "mechanical efficiency" respectively as applied to a gas engine?
   (*b*) What influence upon its thermal efficiency has the compression ratio of a gas engine?
   (*c*) What considerations limit the compression ratio of a gas engine?

DIPLOMA EXAMINATION IN GAS ENGINEERING (Manufacture).

PART I., 2 p.m. to 5 p.m.

(*Four questions only should be attempted.*)

1. Discuss the relative advantages and disadvantages of (i) continuous vertical, (ii.) intermittent vertical, and (iii.) horizontal retorts, in respect of the following:
   (*a*) Capital cost.
   (*b*) Maintenance cost.
   (*c*) Labour cost.
   (*d*) Manufacturing results.
2. Describe types of refractory materials commonly employed in gas-works practice. Give the characteristic properties and the approximate composition of each type, and state the purposes for which it is most suitable.
3. (*a*) Discuss the merits of cleaning coal versus the merits of cleaning coke for (i.) large works and (ii.) small works.
   (*b*) Under what conditions is coal blending advisable?
   (*c*) Give an example of the financial and practical advantages of coal blending.
   (*d*) Show diagrammatically the principal components of a 300 tons per day plant for blending coal.
4. There are two large gas-works with similar power requirements. One is equipped with a number of scattered reciprocating steam engines, and the other with a condensing steam turbo generator driving 3 phase A.C. motors.
   (*a*) What would you expect the relative steam consumptions to be?
   (*b*) Assuming that the feed-water is clean and moderately hard, what type of treatment would you recommend for each works?
   (*c*) What would be the relative sizes of water-softening plant required?
   (*d*) Would a regular analysis of the steam leaving the boilers be of any help to the works manager?
5. (*a*) What items should be included in the figure for "cost of gas into holders?"
   (*b*) Give typical figures of such costs in a works employing:
      (i.) Horizontal retorts.
      (ii.) Horizontal retorts with carburetted water gas plant as a continuous auxiliary.
      (iii.) Continuous vertical retorts.

Diploma Examination in Gas Engineering (Manufacture)

PART II., 6 p.m. to 9 p.m.

(*Four questions only should be attempted.*)

1. Describe three processes for the reduction of sulphur compounds in town gas to not more than 10 grains per 100 cu.ft.
   What advantages are to be obtained by this reduction?
2. (*a*) What features in the design of station governors safeguard the district pressure from variations on inlet pressure? Describe, with the aid of a sketch, a station governor in which the water seal of the bell is not subject to the full effect of the outlet pressure, and state what is the limiting factor to inlet pressure.
   (*b*) You are required to install gas boosting plant giving a pressure increment of 6 in. w.g. when delivering one million cu.ft. of gas per hour to station governors. Discuss, in relation to works conditions, various types of power units which may be used. What is the maximum B.H.P. required by the fan? State the fan efficiency upon which you base your answer. Describe some form of automatic control for regulating fan outlet pressure.
3. A two-lift gasholder with inner lift 100 ft. in diameter and outer lift 102 ft. 6 in., throws pressures of 5 in. and 8 in. respectively. The cups and dips are of channel section 10 in. wide, and with the holder at rest the top of the tank curb is level with the top of the outer lift dip, and with the curb of the inner lift crown. The water overflow is 4 in. below the top of the tank curb. Decide a suitable depth of cup and dip and show by sketches that under normal working conditions a satisfactory seal between the lifts is obtained.
4. What causes are considered to be responsible for the formation of gum in town gas?
   State the evidence on which the conclusions have been based and the precautions to be taken for minimizing gum trouble.
5. (*a*) Describe fully what you understand by the term H.E.V. (Hydrocarbon Enrichment Value). Give a typical example and explain the method of calculation.
   (*b*) Discuss, by reference to current prices and costs, the economics of the recovery of crude benzole from coal gas.
   (*c*) What features are of most importance in the design and working of a gas washer in order to obtain the maximum efficiency of benzole extraction?

GAS SUPPLY.

ORDINARY GRADE.

2 p.m. to 5 p.m.

(*Two questions only in each of the three Groups should be attempted.*)

GROUP A.

1. Sketch and describe fully the operations necessary to cut out and insert a tee on a 6 in. cast iron main (assuming that the main is being fed in both directions). Give particulars of the tools and materials necessary.
2. (*a*) Gas pressure may be expressed in terms of (i.) inches of water, (ii.) inches of mercury, (iii.) lb. per sq.in., and (iv.) atmospheres.
   Explain how these terms are related to each other.
   The specific gravity of mercury = 13·7 and the weight of a cu.ft. of water = 62·3 lb.
   (*b*) State some of the practical uses of a water gauge in the distribution of gas.
3. Give a typical town gas composition. Calculate the CO_2 produced from the complete combustion of 1 cu.ft. of gas, setting out the combustion reactions for each constituent. State the theoretical amount of air required for combustion.

GROUP B.

4. (*a*) What are the advantages of gas lighting for a workshop?
   (*b*) What are the important factors in the maintenance of an efficient works lighting installation?
5. Tabulate and compare the merits of a gradual action and a snap action thermostat. Show by sketches the construction of one type and explain its mode of operation.
6. A hot water supply is required for bath, hand-basin, and sink for a household of five persons.
   What further information would be necessary before a definite recommendation could be made? State what type of apparatus would be required and the probable maximum and weekly consumptions of gas for the purpose.

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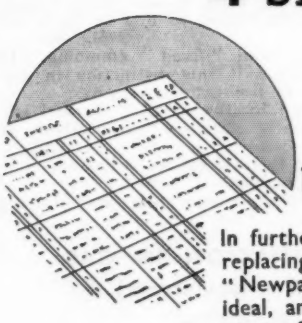

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GROUP C.

7. (*a*) Enumerate the properties of a good heat insulating material and name three kinds that are in extensive use.
   (*b*) Mention three types of gas appliances for which heat insulating material is desirable.
8. Explain the desirability of governing the gas supply to an instantaneous water heater and state the comparative advantages of a constant pressure and a constant volume type for this purpose.
9. (*a*) Describe with the aid of a sketch a gas-fired furnace suitable for annealing, say, brass or steel pressings.
   Give approximate dimensions of the furnace and state the rate of gas consumption and the temperature attainable.

Or

   (*b*) Name three industrial drying processes that can be carried out with gas. Make a sketch of a stove suitable for one of these processes and explain how safety is secured.

HIGHER GRADE.

PART I., 2 p.m. to 5 p.m.

(Two questions only in Group A and three questions only in Group B should be attempted.)

GROUP A.

1. Calculate the cost per therm of gas for central heating to compete with coal at 40s. per ton. State the practical advantages of gaseous over solid fuel for this purpose which would justify a higher price per therm.
2. What points would you take into consideration in recommending the use of flueless heating by gas?
3. Sketch a gas-operated refrigerator showing the essential parts.
   How would you direct a customer in the use of a gas-operated refrigerator?
   What instructions would you give a fitter in fixing one of these appliances?
   What are the possible faults of such a refrigerator and how are they rectified?

GROUP B.

4. Sketch the general arrangement for remote thermostatic control. State some uses of the apparatus. What are the indications of faulty working and how would you proceed to correct the faults?
5. Give a section through a constant pressure governor and indicate by arrows the forces acting on the moving parts.
   How do these forces maintain a constant pressure?
   Why is a constant pressure governor used in conjunction with thermostatic control?
6. With gas at 5d. per therm, what would be the probable cost per hour for gas for generating 20 kilowatts of electrical power by means of a gas engine and dynamo, assuming that the engine is normally running at 70% of full power?
   Draw an indicator diagram for an engine working at 70% full load.
7. Describe fully an industrial application of gas (not central heating) with which you are familiar. Sketch a suitable gas-fired appliance and give approximate dimensions, temperatures obtainable, and rate of combustion.

HIGHER GRADE.

PART II., 6 p.m. to 9 p.m.

(Two questions only in Group A and three questions only in Group B should be attempted.)

GROUP A.

1. It is necessary to reinforce the supply through an existing cast-iron feeder main, 1½ miles in length from the station holder to a village 220 ft. above holder level, which has rapidly developed from 1,000 to 3,000 villa type houses. The maximum pressure available from the holder is 8 in. w.g. and at peak demand the pressure at the end of the feeder main drops to 2½ in. w.g. What initial pressure is required to result in the same final pressure as obtained before the development?
   By what means would you increase the initial pressure to that calculated?
   The gas has a specific gravity of 0·46 and water is 800 times denser than air.
2. Describe the general arrangement of apparatus required by two testers for testing meters in the workshops for accuracy of registration. Explain the methods of test and state the conditions that must be fulfilled before a meter can be officially stamped.
3. What do you understand by the CO/CO_2 ratio in relation to combustion in gas appliances? What margin of safe overload in the gas rate of an instantaneous water heater should be permitted (*a*) with governor control and (*b*) without governor control? Give reasons for your answer.

GROUP B.

4. Set out methods of typical tests of two of the following three appliances:
   (*a*) gas fire; (*b*) thermostatically controlled gas cooker; and (*c*) gas street lamp.
5. A sheet metal shop, 220 ft. long by 60 ft. wide by 15 ft. high, with cream walls and ceiling, is to be lighted by gas. What average floor illumination would you specify and what diversity factor would you allow? Sketch the type of reflector you would employ and give the approximate polar curve. Show disposition of lamps in plan, state the mounting height, and indicate the angle of cut-off you would recommend. What is the price per therm for gas to compete with gas-filled electric lamps supplied with electrical energy at 2¼d. per unit?
6. What precautions must be adopted when fixing instantaneous multi-point water heaters? Describe one form of automatic gas and water valve. Briefly tabulate the advantages and disadvantages of (*a*) low consumption, (*b*) high consumption, storage water heaters, and (*c*) water heaters of the instantaneous multi-point type.
7. To what do you attribute the development and success of town gas as an industrial fuel, despite the fact of its comparatively high price per therm compared with solid and liquid fuels?

DIPLOMA EXAMINATION IN GAS ENGINEERING (Supply).

PART I., 2 p.m. to 5 p.m.

(Three questions only should be attempted.)

1. A gas undertaking has to consider supplying gas to a village of 1,000 consumers five miles distant from the nearest gas main. State the nature of the investigations you would make in order to ascertain all the essential factors. Work out a scheme to meet the village requirements.
2. Review the recent developments in the design of gas cookers, gas fires, and flueless heaters.
3. Briefly describe a gas-fired heating system for a cinema. State the relative advantages and disadvantages of the following methods of heating, and give the relative running costs:

   Coal (40s. per ton).
   Coke (35s. ,, ,,).
   Oil (90s. ,, ,,).
   Electricity (½d. per unit).
   Gas (6½d. per therm).

4. Draw a typical iso-footcandle diagram in a well gas-lighted street of Class F of the British Standard Specification. Assume the staggered arrangement of lamps and mark on the diagram the position of the test points. Apart from installation and running costs, what points would you put forward in favour of gas street lighting?
5. A consumer requires a furnace for carburizing. Describe the process of carburizing and the type of furnace you would recommend, giving approximate dimensions and maximum gas consumption. How is automatic control applied to such a furnace? How would you test the complete equipment to ensure satisfactory working?

PART II., 6 p.m. to 9 p.m.

(Three questions only should be attempted.)

1. Explain the following in relation to gas pipes:
   (*a*) Electrolysis.
   (*b*) Fusion.
   (*c*) Internal corrosion.
   What are their respective effects on the distributing system and how can they be minimized?
2. Discuss the formation and effects of "gum" in gas pipes and appliances.
3. Write a scientific explanation of:
   (*a*) The damage done to furnace brickwork by oxide scales from metals.
   (*b*) The working of an automatic air-gas mixture controller for furnace operation.
   (*c*) The principles underlying the design of non-condensing gas-fired water heaters.
4. Give a brief interpretation of the chief Acts under which gas undertakings operate.
5. Discuss the economics of town gas as an industrial fuel compared with other fuels and electrical energy.

Cookery Courses for Brides-to-Be

Demonstrations by Edinburgh Gas Department

Prospective husbands may be counted upon to express their unqualified approval of the demonstrations to be given by the Edinburgh Gas Department. The Department's new demonstrator, Miss Murray, is arranging this course of lessons and demonstrations for young women who are contemplating setting up house.

The course is planned to last two weeks, and the first lesson will be devoted to the best way of spending the housekeeping money in regard to the food supplies. For the remaining eight lessons the class will have practical experience in working cookers and in cooking.

Another practical scheme on much the same lines is being arranged under the auspices of the Public Health Department. Many of the women who are leaving slum-cleared areas for the new housing schemes have never had an opportunity of using modern appliances. The Department in conjunction with the Gas Department is arranging a series of demonstrations in the child welfare centres in the various districts. Attention will also be directed to dietetics and economical use of various foods.

THE PRODUCTION AND PERFORMANCE OF Domestic Coke

by
Dr. W. DAVIDSON
(of Radiation, Ltd.)

From a Paper read before members of the Scottish Junior Gas Association (Western District) at a meeting held at Glasgow on Saturday, March 27.

(*Concluded from p* 214.)

Examination of Smokeless Fuels.

It was desired to compare the performance of the special domestic oven coke with those of the low-temperature cokes at present being made in Britain, when burned in an open grate or domestic boiler. A series of fuels, comprising coal, six low-temperature cokes, and the special oven coke were examined, using the ordinary type of open grate previously described.

The screening analysis and the bulk density of each fuel are given in Table IV.

TABLE IV.—*Screening Analyses and Bulk Densities of Domestic Cokes.*

Fuel.	On 3 In., %.	On 2 In., %.	On 1 In., %.	On ½ In., %.	Through ½ In., %.	Weight of Fuel per Cu.Ft., Lb.
Coal	0	90	100	..	..	43·7
A. (Low-temp. coke)	Ovoids 2¾ in. × 2 in. × 1⅜ in.				0·7	25·3
B. (,,)	13	90	95	95	4·8	19·7
C. (,,)	22	53	82	93	7·3	21·4
C. (briquettes)	Ovoids 3½ in. × 2½ in. × 1¾ in.				1·0	Approx. 38
D. (Low-temp coke)	50	88	98	99	0·9	25·6
E. ,,	38	82	97	98	1·5	20·5
145 (Oven coke)	7	57	99	100	0·3	26·2

The fuels differed widely in character and appearance. The special oven coke was the strongest of all, although fuels Nos. A and C (briquettes) and D and E were sufficiently strong to withstand much breakage during their transport to the laboratory. Fuel No. B and more especially (not briquetted) fuel No. C were weak and abradable and gave a large percentage of fines. The bulk densities of fuels Nos. B, C, and E were very low, while that of No. C (briquettes) was high and approached nearly to the value of coal.

The analyses of the fuels and the chief results of the open grate tests are recorded in Table V.

The nature of the ash from fuels A and D was little better and also had a detrimental effect on the appearance and efficient burning of the fire after the point of maximum radiation was obtained. The ash from fuel E was better, being coarser, but a large proportion of this ash was white and of low density. Fuel B gave an ash of a more desirable type. Although not so coarse as that from E it was much denser, a fact which accounts for the much higher radiant efficiency obtained from fuel B than from any of the other low-temperature cokes.

All the low-temperature cokes, except E, were very reactive and gave long carbon monoxide flames when burning. The radiant efficiency of the latter fuel was, therefore, higher than that obtained from any of the others giving ash of the same character.

The most unreactive fuel of this series was, however, the oven coke No. 15, and since in addition it contained only a small percentage of coarse ash it gave the highest radiant efficiency. Coke No. 15, although a little more difficult to kindle than the low-temperature cokes, was as easy to kindle as coal. It gave the largest quantity of unburnt fuel, but the weight, 2·7 lb., was not large and would not reduce its value as an open grate fuel.

A very important feature of fuels Nos. E and 15, which are least reactive and which give the most coarse ashes, is that they burn most uniformly and give bright fires for the longest periods without refuelling.

From these results it is apparent that the special domestic oven coke compares very favourably with any of the open grate fuels at present being marketed.

Factors Influencing the Suitability of a Fuel for Burning in an Open Grate.

It is convenient to discuss here the properties which determine the value of an open grate fuel.

The efficiency of a fuel when burned in an open grate is perhaps not in itself very significant in determining its suitability for this purpose, but the factors upon which the efficiency depends are of vital importance. The quantity and especially the nature of the ash is one of the most important factors influencing the radiant efficiency of a fuel.

When the point of maximum radiation is attained the surface of the pieces of fuel burn rapidly and leave a covering of ash. If the ash is in a finely divided state it will cling to the fuel and will cut off to a large extent the radiation from and the supply of air to the fuel.

The rate of burning and radiation therefore decrease rapidly. Should the ash be concentrated in larger pieces of greater density it will not exercise so large a screening effect and may, because of its density, fall from the fuel surfaces.

TABLE V.—*Analyses of Domestic Fuels and Results of Open Grate Tests.*

Open Grate Test No.	Description of Fuel.	Moisture, %.	Ash, %.	Volatile Organic Matter, %.	Net Calorific Value, B.Th.U./Lb.	Size of Fuel Used, In.	Weight of Wood Used to Kindle, Lb.	Time to Give Bright Fire, Min.	Time to Recover After Charging 7 Lb. Fuel, Min.	Weight of Unburnt Fuel, Lb.	Average Rate of Combustion for Period of Bright Fire, Lb./Hr.	Period of Bright Fire, Hr.	Radiant Efficiency, %.
24	Coal	4·8	2·6	29·5	13,100	1 – 3	½	38	17	1·0	3·8	5·0	19·6
	Low-temp. cokes—												
25	A	3·3	3·7	12·0	13,240	1⅜ × 2¾	¼	22	15	0·2	3·4	5·9	23·6
26	B	2·4	4·3	9·0	13,600	1 – 4	¼	28	14	1·1	3·2	6·3	28·8
27	C	2·6	5·8	11·9	13,380	1 – 4	¼	15	14	0·4	3·7	5·5	23·2
28	C (briquettes)	3·3	6·3	17·8	13,050	1¾ × 3½	¼	42	22 (11 lb. added)	0·6	4·4	..	21·4
29	D	1·6	3·9	14·0	13,670	1 – 4	¼	32	14	0·6	3·6	5·6	22·9
30	E	3·9	4·0	6·8	13,300	1 – 4	½	27	18	1·6	3·1	6·4	25·8
	Oven coke—												
31	15	1·7	4·1	4·1	13,370	1 – 3	½	32	17	2·7	2·8	6·9	31·2

Results of Open Grate Tests.

These results show that the performances of the low-temperature cokes were generally better than those of coal. Each gave a brighter fire more quickly when kindled or replenished, a higher radiant efficiency, and usually less unburnt fuel. The ash, however, from most of them was fine and of low density and detracted very much from their radiant efficiencies. This was especially so in the case of each of the No. C fuels. Fuel No. C sparked violently when kindling and after refuelling and this alone would practically prohibit its use as an open grate fuel. Moreover, the briquettes of this fuel were no less smoky than coal.

TABLE VI.—*Analyses of Fuels and Results of Domestic Boiler Tests. (a) Boiler No. 1.*

Test No.	Fuel.	Moisture, %.	Ash, %.	Volatile Organic Matter, %.	Fixed Carbon, %.	Calorific Value, B.Th.U./Lb.	Size of Fuel, In.	Rate of Combustion, Lb./Hr.	Efficiency of Boiler, %.
1	Coal—Doubles	4·8	2·6	29·5	63·1	13,100	1 – 2	4·2	31·5
	Anthracites—								
2	Scottish singles	2·5	3·2	7·7	86·6	14,400	⅜– 1½	3·3	42·6
3	Scottish doubles	2·4	2·5	8·1	87·0	14,560	1 – 2	3·4	43·0
4	Welsh singles	2·1	1·4	4·4	92·1	14,670	⅜– 1½	2·9	42·0
	Low-temperature cokes—								
5	A	3·3	3·7	12·0	81·0	13,240	1½×2¾	3·3	44·7
6	B	2·4	4·3	9·0	84·3	13,600	¾– 2	3·2	44·1
7	C	2·6	5·8	11·9	79·7	13,380	¾– 2	3·0	43·7
8	D	1·6	3·9	14·0	80·5	13,670	¾– 2	3·5	43·4
9	E	3·9	4·0	6·8	85·3	13,300	¾– 2	3·1	43·2
10	F	5·9	2·3	17·7	74·1	13,100	⅜– ¾	3·9	33·9
	Experimental oven cokes—								
	(*a*) Made from treble nuts of coal 1—								
11	4 (18 hours at 800° C.)	2·6	3·8	5·2	89·0	13,350	⅛– 1	3·3	49·2
	(*b*) Made from 50% double, *plus* 50% single nuts of coal 1—								
12	7 (18 hours at 800° C.)	3·0	5·7	4·8	86·5	12,990	½– 1	3·4	46·6
	Full scale oven cokes—								
	(*a*) Made from crushed coal—								
13	3 (15½ hours at 1,320° C., 14 in. oven)	1·3	10·0	1·4	87·3	12,550	½– 1½	3·5	45·1
14	1 (28 ,, 1,150° C., 18 ,, ,,)	0·4	9·2	0·8	89·6	12,840	½– 1½	3·1	46·8
	(*b*) Made from treble nuts of coal 3—								
15	10 (17 hours at 1,030° C., 14 in. oven)	0·6	4·1	3·3	92·0	13,560	½– 1½	3·1	48·8
	(*c*) Made from treble nuts of coal 1—								
16	14 (25½ hours at 1,200° C., 18 in. oven)	1·0	4·0	1·7	93·3	13,550	½– 1½	3·0	49·1

Another factor which influences the radiant efficiency of a fuel, but to a less extent, is its reactivity. In the case of highly reactive cokes a large percentage of the fuel combines with the carbon dioxide formed in the lower part of the fuel bed to give carbon monoxide, which combines with oxygen at the surface of the fuel and burns with a blue flame. These flames have a low radiant efficiency, and, therefore, the greater the percentage of fuel used up in this way the lower will be its radiant efficiency.

The open grate tests have also shown that the combustibility (reactivity to oxygen) of a fuel plays an important part in determining its efficiency. Cokes were examined which were so difficult to burn that only that in the centre and back of the fire burned brightly while the coke in the front remained dull and cut off a large percentage of the radiation from the freely burning coke, thereby reducing its radiant efficiency.

The real significance of the radiant efficiency of a fuel is apparent when the effect of the determining factors—namely, the quantity and nature of the ash, its reactivity, and combustibility, on the appearance and general performance of the fuel when burned are examined. The very detrimental effect which a fine ash of low density has on the appearance of the fire cannot be too greatly stressed, and it seems imperative that coke intended for burning in open grates should be made from uncrushed nut coal.

The more reactive the fuel the longer will be the carbon monoxide flames which burn on the surface of the fire, and this would be a very desirable feature were it not for the attendant drawbacks. A fuel which is very reactive to carbon dioxide is generally very reactive to oxygen, and when kindled the rate of radiation and burning increase very rapidly to a value depending on the weight of the fuel in the grate, even although air is hindered from passing through the bottom grate by closing the fret. The rate of burning can, therefore, be kept within reasonable limits only by having a comparatively small quantity of fuel in the grate, and this necessitates frequent refuelling.

The rate of burning and radiation of the unreactive but nevertheless easily combustible coke made from uncrushed coal nuts can be much more effectively controlled by adjusting the volume of air passing through the bottom grate of the fire. A much greater weight of this unreactive fuel than of the very reactive low-temperature cokes may be charged to the fire, still keeping the rate of burning and radiation similar in both cases, and, therefore, the fire requires much less frequent refuelling in the case of the special oven coke.

Domestic Boiler Tests.

The manufacturers claim that domestic boilers are suitable for burning coal, coke, or anthracite, but usually show some preference for the last-mentioned fuel. The tests described here were carried out to compare the performances of a series of fuels when burned in a domestic boiler. This series comprised coal nuts, low-temperature cokes, anthracites, graded furnace coke, and the special domestic cokes made by carbonizing coal nuts in ovens.

A diagram of the boiler used for this series of tests is given in fig. 1. This type is in common use for the supply of hot water in medium-sized houses. The boiler was not lagged and lower efficiencies were, therefore, obtained, but it is usually desired that some of the heat be used to warm the apartment in which it is installed.

About 40 to 50 lb. of each fuel was burned at a rate of approximately 3 lb. per hour, and the efficiency of the boiler for each test together with the analysis of each fuel are shown in Table VI. The poorest result is obtained from the coal nuts, then come the anthracites giving efficiencies 40% higher, then the low-temperature cokes, still a little higher, and finally, highest of all, the oven cokes. The oven cokes made from treble nuts (Nos. 4, 10, and 14) give efficiencies 60% higher than that obtained from coal and 15% higher than that from the best quality of Welsh or Scottish anthracite. The smalls from the blast furnace cokes Nos. 1 and 3, made from crushed drosses, and having high ash contents, give good results, and it might be thought that it was unnecessary to manufacture a special coke for the domestic boiler. These boilers have, however, a small fuel capacity and a fuel which will burn

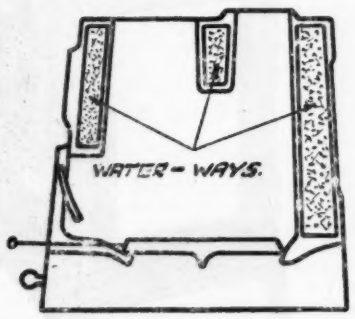

Fig. 1.

unattended at a slow rate for a considerable period is necessary. The ½-1 in. size of cokes Nos. 4, 10, and 14 will burn unattended for 27 hr. in a heating appliance having a capacity of only 10 lb. of coke, while the 1-3½ in. size of the same fuels continues to burn for 12 hr. in the same appliance. These values compare favourably with those obtained for anthracite and are almost double those obtained for the same sizes of the most combustible Scottish furnace coke (No. 3). The flexibility of the special domestic oven cokes is so great that no difficulty in maintaining the fire overnight would be experienced.

Test No. 10 was made with a small size of an extremely reactive low-temperature coke. This fuel was quite unsuitable, giving very long carbon monoxide flames which passed up the chimney and greatly increased the flue loss. The other low-temperature cokes and anthracites gave some flame in the flue, but the oven cokes, being much less reactive, did not, and having, therefore, a more localized heating effect they gave higher efficiencies. There is, therefore, as in the open grate tests, a relationship between the efficiency of the fuel and its reactivity.

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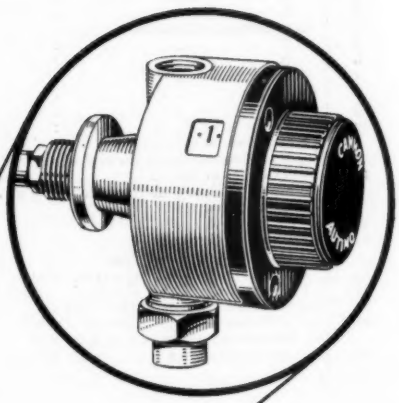

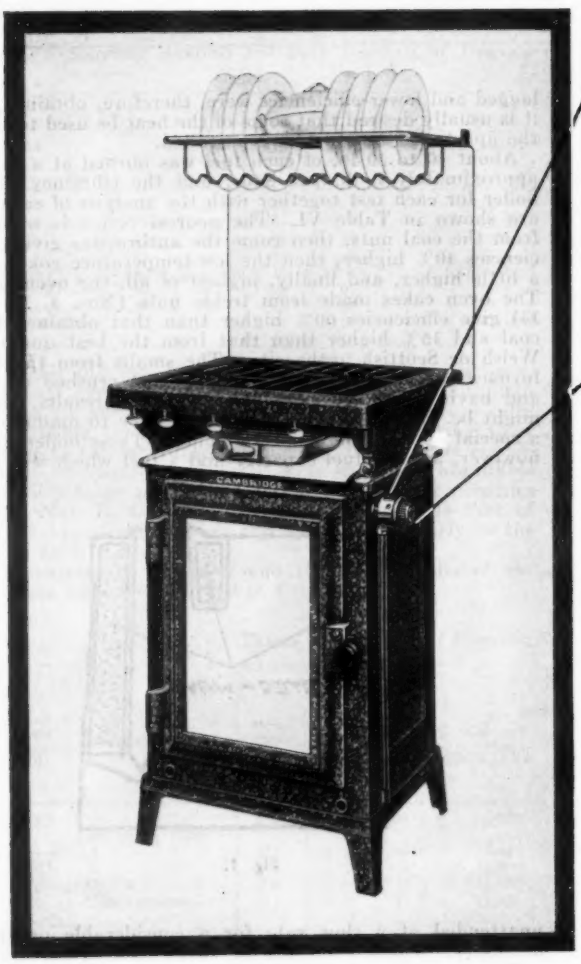

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Comparison of the Performance of Anthracite and Domestic Oven Coke Nuts in Domestic Boiler No. 2.

A further series of tests were made when the performance of the special domestic oven coke, No. 17, made from treble nuts in 14 in. ovens (16 hr. at 1,000° C.) was compared with that of good quality anthracite when burned at various rates in a domestic boiler (No. 2) of similar construction to boiler No. 1.

The analyses of the fuels and the boiler efficiencies obtained for these tests are shown in Tables VII. and VIII. and the efficiencies are also shown graphically in fig. 2.

TABLE VII.—*Analyses of Fuels.*

Fuel.	Moisture. %	Ash, %.	Volatile Organic Matter, %.	Fixed Carbon, %.	Net Calorific Value. B.Th.U./Lb.
Anthracite .	3·6	4·7	8·3	83·4	14,200
Coke . . .	1·7	5·6	4·4	88·3	13,170

TABLE VIII.—*Boiler Efficiencies for Anthracite and Coke.*

Rate of combustion, lb./hr.	½	1	1·2	2	3	4	5	6
% efficiency of boiler when burning anthracite . . .	45·0	45·5	46·0	47·0	48·2	49·0	49·5	49·4
% efficiency of boiler when burning coke	60·5	66·5	70·0	66·0	61·2	58·0	55·8	..

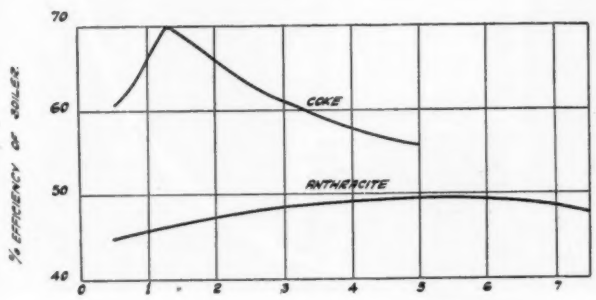


FIG. 2.

COMPARATIVE BOILER EFFICIENCIES FOR ANTHRACITE AND DOMESTIC COKE AT DIFFERENT RATES OF BURNING.

These results show conclusively that the special domestic coke is a much more efficient fuel, especially at slow and moderate rates of combustion, than anthracite. At a rate of burning of 1·3 lb./hr., a rate which is very often used with this size of boiler, the cokes give an efficiency 50% higher than the anthracite. Although the boiler contains only about 12 lb. of coke the fuel can be burned at very slow rates and no difficulty was experienced in maintaining the fire overnight (14 hr.) and for much longer periods when required. The efficiencies obtained for anthracite vary but little for the different rates of combustion, while those for the coke increase considerably to a maximum for a rate of 1·3 lb./hr. and then decrease again for high combustion rates. A considerable part of the heating in a small domestic boiler is by radiation from the fuel and this not only explains why coke is so much more efficient than anthracite, but also why the efficiency varies with the rate of combustion in the case of the coke.

At very slow rates of combustion the air entering at the bottom of the fuel bed is soon used up, giving carbon dioxide, and the coke, being comparatively unreactive, does not combine with this to give carbon monoxide which would burn on the surface of the fuel bed. The surface of the fire remains dull, therefore, until air is supplied at such a rate that some passes up through the fuel bed and burns the coke on the top, which then radiates freely and efficiently to the boiler surfaces. When air is admitted to the fire at a still greater rate there will be an excess of air, and this, because of its passage through the hot fuel bed, will carry away an excessive percentage of sensible heat to the flue, since little provision is made in small domestic boilers for the efficient extraction of the heat from the flue gases.

The anthracite, however, is comparatively reactive, and the carbon dioxide formed in the lower part of the fuel bed reacts with the fuel in the upper part of the bed, giving carbon monoxide, which burns at the surface of the fuel and radiates heat to the boiler. There is, therefore, a more uniform rate of radiation per lb. of fuel burned at the various rates in the case of the anthracite, but this formation and burning of carbon monoxide is a very inefficient method of burning the fuel. The flames, having a very low radiant efficiency, considerably increase the flue gas temperature.

This coke was also tested in a "heat storage" cooker which has a maximum rate of combustion of about ¾ lb./hr. Since the coke can be burned at exceptionally slow rates it has proved to be very economical and in every way suitable for this appliance. It gives excellent results in all stoves but is particularly suitable for the semi-closed type which is now becoming very popular. This stove is provided with two doors which are closed for overnight burning at slow rates, and are opened in the daytime to give the appearance of an open grate. A large size of fuel is necessary for burning with the doors open and it is usually necessary to keep also a small size for overnight burning. The 1-3 in. size of this coke, however, will burn unattended for 12 hr. even in the small sizes of this stove, which have a fuel capacity of only 10 lb.

Use of Specially Designed Coke Grates.

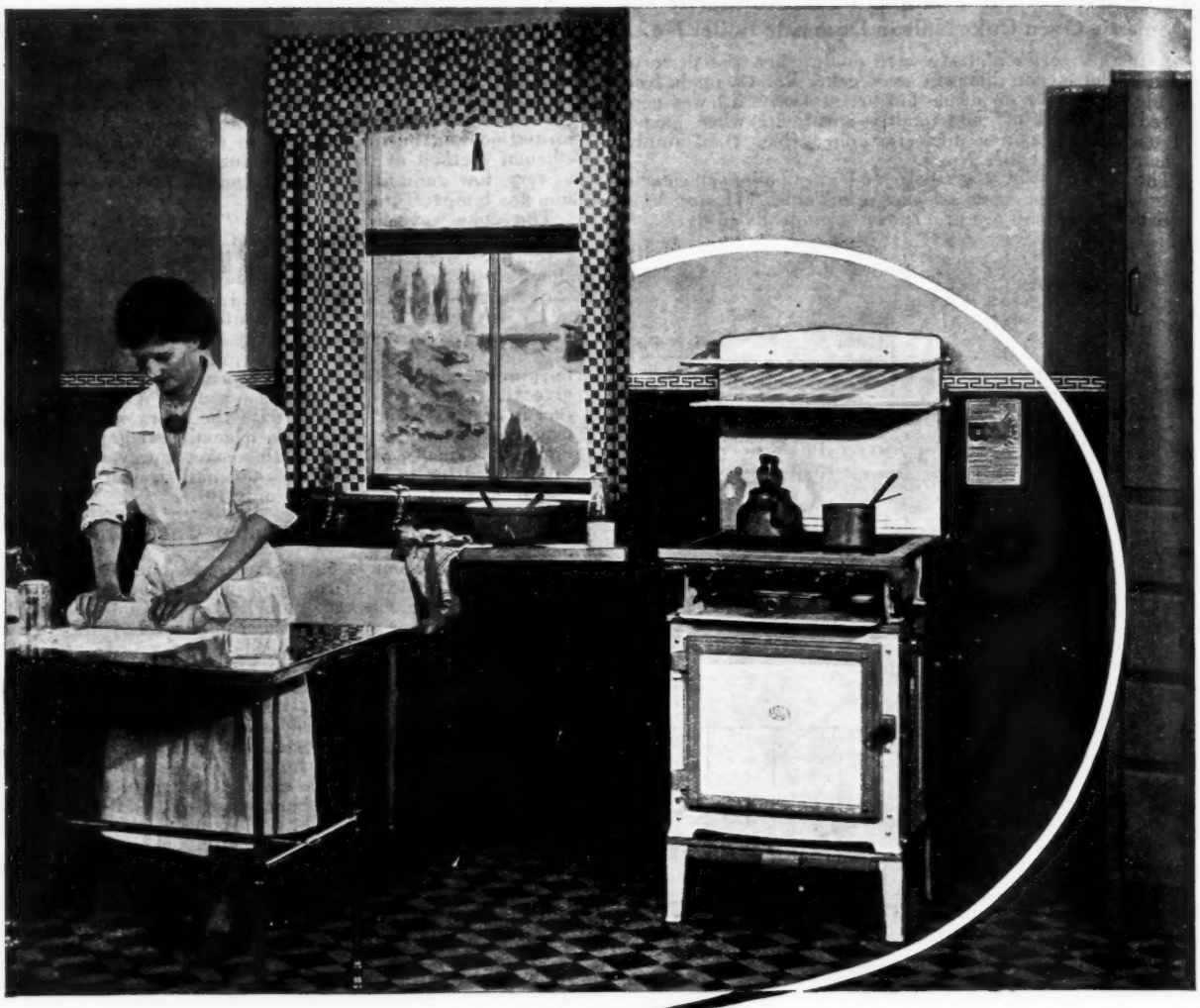
Reference was made earlier to a second method of attacking the problem of replacing coal with smokeless fuel for the domestic market—namely, to provide a specially designed grate for burning the comparatively unreactive high-temperature cokes produced in gas retorts and coke ovens. Considerable research has been, and is being, carried out to provide suitable coke grates, and it is now possible to obtain a very attractive series. These grates will burn with excellent results a very wide range of gas retort cokes. Vertical retort cokes give the best results, but a very satisfactory performance is also obtained from many horizontal retort cokes. The design of coke grates is, however, continually being improved and it is quite possible that grates may yet be produced which will burn satisfactorily even the most unreactive cokes produced.

Those who have had experience of coke grates using a properly graded clean gas coke appreciate the tremendous advance which has been made in their design. The coal grate has been equalled in attractiveness and greatly surpassed in convenience and efficiency. No paper and sticks are required, the ash is simply raked into the ashpan and removed from the grate, fresh fuel added, and a light applied to the gas burner. A self-supporting fire can be obtained in 15 minutes and a bright glowing fire in 30 to 40 minutes from lighting. The rate of combustion can then be more or less efficiently controlled according to the type of grate used. With a special type of grate the combustion rate can be varied between 1 and 2¾ lb. per hr. for the 16 in. size, and the fire may be maintained for 5½ hr. without attention.

The tests which have been described show conclusively that high-temperature coke possesses many advantages over the more reactive low-temperature cokes, and therefore, even if it were possible to produce low-temperature coke at the same cost as high-temperature coke, its use would not become general. It is inevitable that in the future the public will demand the most efficient and cheapest fuel, and the success of the high-temperature coking industry is therefore assured. It will, of course, be essential to burn this coke in specially designed grates, but this is an advantage, because the saving in labour attending the use of these modern grates is certain to provide an additional incentive to their adoption.

These tests have further shown that a greatly superior domestic coke is obtained from uncrushed coal nuts than from crushed coal. Its chief advantages are that it is more easily ignited, gives a more attractive fire, is denser, burns unattended for longer periods, is more efficient for use in open grates, boilers, &c., and contains a denser ash. By carbonizing coal nuts in retorts or ovens at a temperature of about 1,000° C. a most excellent domestic fuel would be obtained. Although it is not always safe to generalize, the three coals used for these investigations were Scottish coking coals of widely different character, and it is therefore probable that the conclusions made will be applicable to many coals from different coalfields.

It may be considered that it is not economic to coke nut coal, but it should be noted that this suggestion is made only for the manufacture of coke to replace lump or nut coal in the domestic market. It will be necessary to use nut coal since there will not be an adequate supply of coal dross for the manufacture of sufficient coke to supply the domestic market. Even to-day it is found necessary to use nut coal for the manufacture of metallurgical coke



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because of the dearth of dross, notwithstanding the fact that a weaker coke which is less suitable for certain industrial purposes is obtained from the crushed large coal.

It would therefore be most satisfactory to use nut coal for the manufacture of domestic coke and coal dross for metallurgical coke. It is important to note that the tests described have shown that this nut coal should not be crushed or mixed with any proportion of dross before coking to obtain the best domestic coke.

The success of high-temperature coke as a domestic fuel is largely dependent on the coke maker's full appreciation of the fastidiousness of the market to be supplied. The fuel must be uniform in quality, sufficiently combustible, properly sized, and should contain only a small percentage of dense ash. A careful study of the requirements of the market combined with a careful control of the quality of the fuel will ensure the successful replacement of coal by coke for domestic purposes.

In conclusion the Author would like to express his appreciation to the following for their assistance in the work described and/or for their permission to publish these results: The Scottish Coke Research Committee, the Royal Technical College, Radiation Ltd., James Nimmo & Co., Ltd., Plean Coal Company, and Smith & Wellstood, Ltd.

Discussion.

Mr. WEBSTER (Port Glasgow, President) said that at Glasgow two-thirds of their production of coke was sold in ½-cwt. bags for domestic purposes. The coke was made in Glover-West vertical retorts and was comparatively reactive. Dr. Davidson had stated that the best results had been obtained from open grate tests of the 1 in. to 3 in. size of coke made by carbonizing treble coal nuts in 14 in. ovens for a period of 16 hours. Mr. Webster stated that while the coke produced in vertical retorts would be similar, he had found that the ¼ in. to ¾ in. size was the most popular size for domestic purposes, and asked the reason for this. He considered that the finely divided ash obtained from cokes made from crushed coal need not have a detrimental effect on the heat radiated from the fuel since this ash could be removed by poking.

Mr. MACLAREN (Newton-on-Ayr) remarked that where vertical retorts were in use and a gas having a calorific value of 450 B.Th.U. cu.ft. was made, there was generally, after supplying producers, boiler, &c., a salable surplus of 5 to 8 cwt. of coke per ton of coal carbonized. In dull times there might be some difficulty in disposing of this surplus, but at the moment the entire output could be sold twice over. Was, therefore, the domestic consumer to be made the stop-gap for dull times? It appeared to him that they must go all out for the domestic coke consumer or not at all. If the former was to be their objective, then he could envisage an all-round increase in the calorific value of the gas supplied. The opposite school of thought tended to total gasification and the disappearance of gas coke from the market. This latter idea would probably suit the Gas Industry better, since the by-product, coke, would not then be competing with the primary product, gas. He thought that even Dr. Davidson would admit that gas was a better smokeless fuel than coke. The major portion of their output of coke was supplied for bakers' ovens, and they had found that the most suitable coke was made from a mixture of equal parts of coking coal dross, treble nuts, and triping. Dr. Davidson had stated that the cost of carbonizing decreased with increase of the temperature of carbonizing, but he thought that this only held up to a certain limit of about 1,400° C. He even doubted whether it was cheaper to carbonize at 1,400° C. He was surprised that it was possible to charge a greater weight of nut coal than crushed dross to an oven. He considered that the marketing of coke to the small consumer presented a difficult problem, the cost of bagging and delivery being heavy. In short, he could not see that catering for the domestic coke consumer could be profitable to a gas undertaking if coke was to be sold at a competitive price with other solid fuel, even at the high prices at present obtaining.

Mr. DAVIES (Alexandria) pointed out that the moisture contents of the cokes examined were comparatively low, and asked what effect high moisture contents would have on the results obtained.

Mr. GREIG (Glasgow) said he noted with interest the recommended use of flue temperatures of 1,000° C., but that to him savoured of low-temperature carbonization. Did the coke after discharge give much flame? In continuous vertical retorts coal ran in at an angle from the coal feed hopper and no matter what type of coal charged, the coke was always rough and open in texture due to segregation. That was why, in his opinion, vertical retort coke was more easily ignited than that made by other methods. He noted the distinction made between the combustibility and the reactivity of coke. He agreed with Dr. Davidson regarding the detrimental effect of fine ash on the burning of a coke. He asked if the effect on the combustibility of the resultant coke of blending the coal with breeze had been determined. He considered that to adopt the practice of coking nut coal, a coal screening plant would be necessary and this would be a disadvantage in the case of small undertakings.

Mr. STURROCK (Greenock) asked for information regarding the relative efficiency of vertical retort coke to anthracite, low temperature coke, and the other fuels used for the boiler tests recorded in Table VI.

Mr. SMITH (Dumbarton) said he had previously been of the opinion that combustibility was entirely dependent on the volatile matter content of the coke. He agreed with Dr. Davidson that research would ultimately produce a grate which would be suitable for burning even the most unreactive cokes. In his area the most popular size of coke for domestic use was ¾ in. to 1½ in. He considered that the frequent stoking required when using coke was a great disadvantage.

Dr. Davidson's Reply.

Replying to Mr. Webster on the question of the size of coke sold in his area (Port Glasgow) for domestic use, Dr. DAVIDSON said that ¼ in. to ¾ in. coke was quite unsuitable for burning in open grates, no matter what the combustibility of the coke was, since the resistance of the fuel bed would be too great to allow the passage of sufficient air to give the required rate of combustion. This coke, sold in the Port Glasgow area must therefore be used for appliances in which the firebox could be closed, such as the usual types of kitchen ranges, to give a forced draught through the fuel. For this type of appliance this small size of coke had much to commend it, since it would be more reactive than the largest size and would give more carbon monoxide flame and therefore a higher temperature to the flue gases used for heating the hotplate and oven. The larger size of coke gave too localized heating for the production of uniform oven temperatures. The small size of coke would also have the advantage of being able to burn unattended for longer periods at slow rates of combustion than the larger size. Mr. Webster had stated that finely divided ash need not have a detrimental effect on the performance of the fuel since this ash could easily be removed by poking. Dr. Davidson pointed out that this would not only cause the fine ash to fly into the room but would seriously affect the rate of radiation and efficiency of the fire. A coke fire should not be poked except to remove the ash immediately before refuelling. The poking of the fire between refuelling periods caused a collapse of the fuel bed and a reduction of the radiating surface.

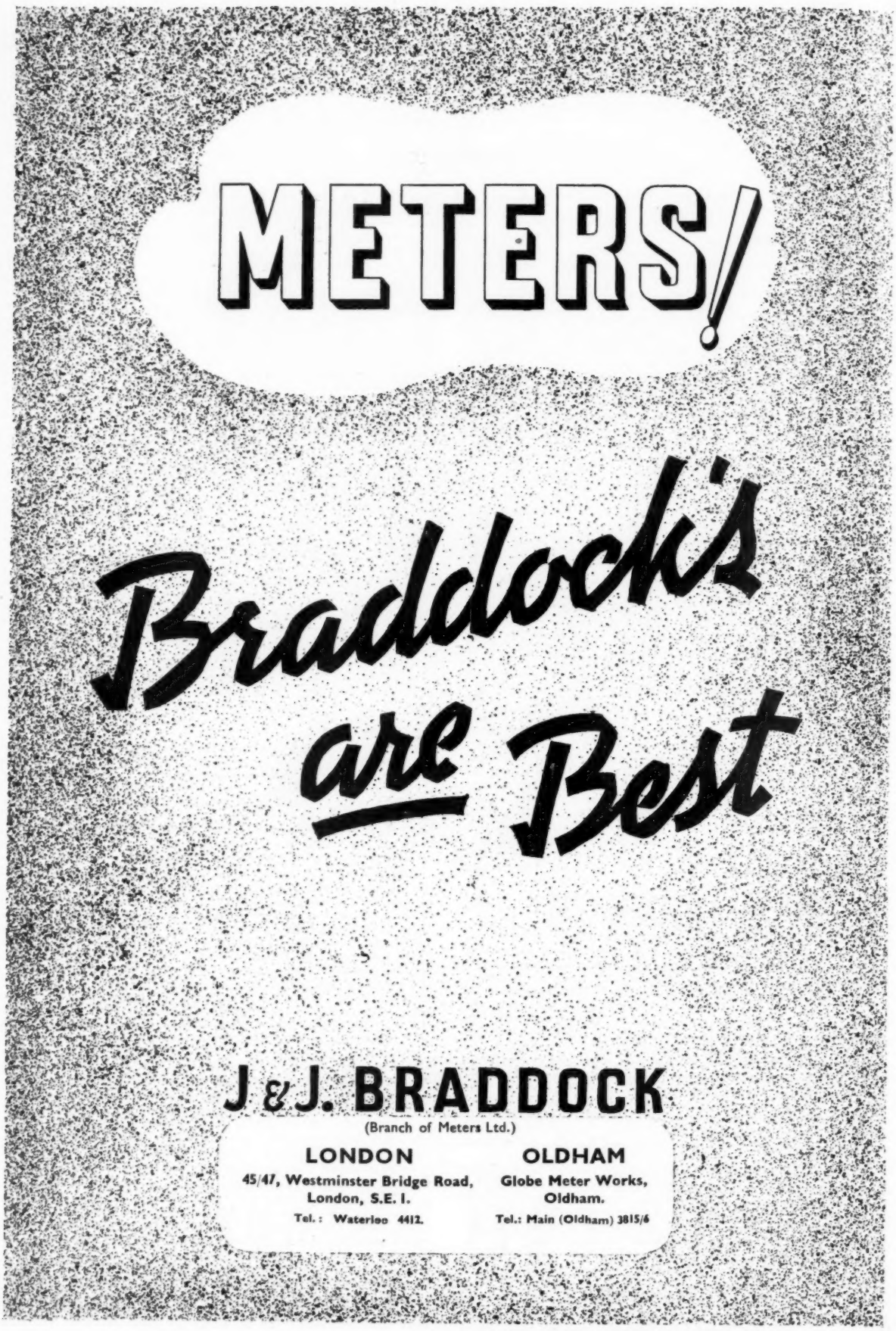
Dr. Davidson said he agreed entirely with Mr. MacLaren when he stated that they must go all out for the domesic coke market or leave it alone and not make the domestic consumer the stop-gap for dull times when there was much surplus coke. The domestic market, he said, was a remunerative one, and would repay all the attention given to it. It was Mr. MacLaren's view that complete gasification should be the aim of the Gas Industry, but Dr. Davidson considered that for many years to come a large proportion of the British public would continue to favour the solid fuel open fire, and attention must be given to the demand for solid fuel. Dr. Davidson explained that his statement regarding the relative cost of producing coke at low and high temperatures held only for the carbonizing temperatures used in present practice—namely, from 700° to 1,400° C.

In reply to Mr. Davies, Dr. Davidson said that the cokes which had been used for the tests described had been air-dried, since it was desirable to remove any variable which might mask the effect of carbonizing conditions on the combustibility, &c., of the coke. Tests had been made to determine the effect of moisture content on the performance of an open grate fuel, and these had shown that the rate of kindling and recovery of the fire after refuelling were seriously reduced with high moisture contents, resulting in a considerable reduction in the efficiency. The combustion of wet coke was also noisy.

Replying to Mr. Greig, Dr. Davidson did not agree that the use of flue temperatures of 1,000° C. approached those of low temperature carbonization, which were usually below 750° C. When carbonizing coal nuts in 14 in. ovens with flue temperatures of 1,000° C., there was very little flame from the coke on discharging, even when remote water quenching was employed. They had found that the blending of crushed coal with finely crushed coke breeze, although increasing the shatter indices of the resultant coke and thereby improving its value for metallurgical purposes, did not increase the combustibility of the coke. He was glad to have Mr. Greig's support on the desirability of having a coke with coarse ash for domestic purposes, and agreed with him that this would in most cases make it necessary to screen the coal before carbonizing. He considered, however, that the advantages gained in the increased quality of the coke would well repay any additional work.

In reply to Mr. Sturrock, Dr. Davidson stated that vertical retort coke was considerably more efficient than low-temperature coke when burned in a small domestic boiler, and gave an efficiency approximately the same as good quality anthracites and a very little lower than the high temperature cokes described in Table VI.

Replying to Mr. Smith, Dr. Davidson agreed that coke having a bulk density of only half that of coal would require more frequent stoking. He considered, however, that the advantages of the former fuel far outweighed this disadvantage, and pointed out that using the modern coke grate and vertical retort coke the fire would require refuelling only at intervals of 2½ to 4 hours, depending on the rate of combustion desired. Using the denser coke made from nut coal the refuelling intervals would be longer. In the case of closed heating or cooking appliances designed for coke-burning a larger firebox and fuel hopper were used, thus obviating the necessity for more frequent refuelling.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Bombay Gas Company, Ltd.

The Annual Ordinary General Meeting of the Proprietors of the Bombay Gas Company, Ltd., was held at the Registered Offices of the Company, Moorgate Station Chambers, London, E.C. 2, on Wednesday, April 28, 1937—Mr. WILLIAM GRAHAM BRADSHAW, C.B.E. (Chairman of Directors), presiding.

The SECRETARY (Mr. E. Comber) read the notice convening the meeting, together with the reports of the Auditors; and the Directors' Report and Statement of Accounts for the year ended Dec. 31, 1936, were taken as read.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN, in moving the adoption of the report and accounts, said:

The Company was first registered as a limited company on April 26, 1862, so we have been in existence just 75 years.

The Company has again experienced a successful year despite two temporary setbacks—viz., the death of the King Emperor George V., which restricted business for some ten days in the month of January, and also the outbreak of Communal Riots in the Autumn which lasted intermittently for 5-6 weeks and dislocated most of the Public Utility Services. I am happy to say, however, that the Company carried out successfully its obligations under the Municipal Lighting Contract, due credit for which must be given to the Public Lighting Superintendent, Mr. Blackmore, and his Indian Staff.

As you all know, competition in most branches of trade becomes more severe year by year, and the Gas Industry is no exception to this state of affairs. The Company, however, works amicably with its electrical friends, thanks to the spirit of co-operation which our General Manager in Bombay has done much to foster. The Company's propaganda work has also had its effect generally, while the showroom in Hornby Road becomes more popular day by day and contributes towards teaching the public of Bombay to a greater appreciation of the general convenience and usefulness of gas. In the slang of the day, it helps to make people "Gas-minded."

Trade Improvement.

Trade in general has continued to improve, money has been cheap, and the General Manager in Bombay reports that the mills have been working at full capacity, the shipping industry has increased its turnover, unemployment has been reduced, skilled labour has been and is at a premium, while the Government, Port Trust, and Municipality have all reported increases in their revenue. The natural sequence of this improvement is a restoration of confidence, and this has led to extensive building operations which I mentioned last year had already commenced. The Municipality has spent considerable sums in laying down roads in the reclamation areas, especially to the south of the Island in the Colaba District. The development of building operations in this area has benefited, and will benefit, the Company, and we have so far obtained our full share of the demand that has arisen for facilities for cooking and water heating—and doubtless we shall continue to do so.

Increased Sale of Gas.

During the year under review the sale of gas for heating purposes has increased by 4·5%, while the total sale of gas shows an increase of 3·38%, thus maintaining the improvement in the Company's business which commenced in the year 1933 after three years of decreased sales due to the unsettled state of the City brought about by Riots and Civil Commotions. Since the year 1932 the sale of gas has shown annually an increase, and it is satisfactory to record that the total increase for the past four years amounts to as much as 50 million cu.ft., or 10%.

In spite of competition no less than 2,847 separate gas appliances of all kinds were disposed of in 1936 against 1,981 during the previous year. Correspondingly the number of consumers has increased by 606 to a total of 8,917. Both the Board and Mr. Lane leave no stone unturned in an endeavour to remind the public of Bombay that the use of gas for heating is a wise and economical course to adopt.

New Refrigerator Department.

Even refrigeration by gas requires heat, and I should like to bring to your notice that we have in operation on the district now some 283 Electrolux gas refrigerators. Towards the end of 1935 we brought to the notice of Mr. Lane the remarkable popularity of gas refrigerators in this country and urged him to consider carefully the question of introducing these machines into Bombay. Although somewhat sceptical at first as to their efficiency in such a climate as that of India, he reported, after having made prolonged tests, that he was satisfied that they would stand up to the conditions appertaining over there. The work of launching the new refrigerator scheme was largely entrusted by him to the Company's Assistant Manager and Engineer, Mr. L. W. Boulter. That he has scored an initial success can be judged by the fact that although the scheme was not started until July 1, 1936, there are, as I said just now, already some 283 machines on hire on the district. The capital outlay for these apparatus has been heavy, and although the consumption of gas per machine (some 15,000-20,000 cu.ft. per annum) is small in comparison with the capital cost of the machine, the interest of gas has been considerably advanced in Bombay. The gas refrigerator not only consumes gas but it acts as an excellent advertisement inasmuch as it is most useful in a tropical climate, although it is mystifying to most people how a gas flame can cause freezing—hence the slogan "the flame that freezes."

Capital Expenditure.

I mentioned last year that the increasing demand for gas in Bombay would necessitate more capital expenditure in the form of mains, new meters, and water heaters, and to-day I repeat the remark. In his annual report to the Directors our General Manager in Bombay points out that the growth of the Company is causing him a little anxiety as regards the distribution system.

In order to avoid as far as possible the heavy cost of laying a supplementary trunk main he is at present endeavouring to improve the system at various points to the south of the Island where building operations have been more extensive than elsewhere. This part of the Island, which includes much of the reclamation area, is developing rapidly, and we shall not be surprised if Mr. Lane is forced in the near future to submit to us a scheme for dealing with the increased demand for gas. You can rest assured, however, that no capital expenditure has been or will be incurred without the most careful thought and attention on our part.

The Accounts.

I will now deal with the salient features of the accounts and balance-sheet.

The expenditure shown on the capital account for the year in respect of meters, cookers, and mains amounts to £6,457, but this figure is only a balance one as the Company incurred in addition an expenditure on refrigerators of £7,087 5s. 4d. In view, however, of their unknown durability, the Board have deemed it prudent to debit the revenue account with this sum to the relief of capital. Furthermore, a sum of £7,290 has been written off the value of meters, cookers, and water heaters in respect of depreciation—a necessary and sound financial operation.

In total, therefore, capital account has been relieved of no less than £14,377. That the capital account is on a satisfactory footing is evidenced by the fact that the capital cost of meters, cookers, geysers, and refrigerators on hire on the district at Dec. 31, 1936, was over £47,000; yet their capital value in our books stands at only £22,000—a great improvement on the position of affairs some eight years ago.

It is both interesting and gratifying to note that the amount of gas sold works out at only £759 per million cu.ft.—a record figure for this Company and a very satisfactory position for a gas company in a tropical country. In fact, this capital cost compares favourably with that of many gas undertakings in this country. I can remember the time when our capital cost per million was as high as £1,794.

Revenue Account.

Passing on to the revenue account, coals have cost us £1,994 more, due to an increase in the price of 4 annas per ton for 9 months of the year and also to the fact that we have carbonized 1,147 more tons of coal.

Repair and maintenance of works shows a reduction of £1,357, but the figure for the year 1935 contained a sum of £1,285 in respect of part of the cost of a new washing plant, so that the total cost of manufacture this year really shows (as compared with a normal year) a decrease of £72.

Distribution costs have risen by only £2,890 in spite of the capital cost of refrigerators (£7,087) and the depreciation of meters and stoves (£7,290 against £5,053 last year) having been charged to repair and renewal of meters and stoves. There is a welcome reduction in the cost of fittings of £1,711 due to more profit having been made from the increased sale of heating appliances. The cost of repairing mains and services is less by £3,159 due to fewer repairs having been necessary.

Rents, rates, and taxes is increased by £2,872. This account, however, shows an expenditure for a normal year, as you may remember that last year the Company had a "windfall" in the form of an extra relief of Indian income-tax amounting to

£4,086. If (for comparative purposes) this sum is added back to last year's figure we find that really there is a reduction of £1,213 in the amount of this account which compares favourably with my forecast last year that it would be some £1,000 less this year.

The only item under the heading of Management that calls for comment is general charges, which is lower by £922. This is due to the cost of two years' premiums in respect of the Insurance of the Company's property against riots, fire, and civil commotions having been charged in the previous year.

The cost of passages shows a reduction of £874, but this is always a fluctuating figure, as it depends upon the number of the members of the Company's European Staff who are on furlough.

In spite of capital expenditure amounting to some £14,000 having been charged to revenue, the total expenditure comes out at £118,440 2s. 2d., or an increase of only £5,075, which I trust you will agree is very satisfactory. It is interesting to note that the total cost of wages and salaries included in the revenue expenditure amounts to some £50,000.

On the other side of the revenue account there is an increase of £3,094 in the revenue from the sale of gas, which is both gratifying and encouraging. The rentals for meters, stoves, and refrigerators also show an increase of £884. Coke and breeze have produced £374 more. In this connection our General Manager reports that although the sales of "domestic" coke are increasing, our large coke (being a soft coke) cannot compete with the Bengal hard coke which is used for sugar boiling, &c., and to enable us to hold our own against this severe competition it has been necessary to reduce our prices.

Tar continues to be a source of anxiety. The Japanese competition has disappeared, but large quantities of Bengal tar have been imported into Bombay. We managed to dispose of more than our production, but the average rate at which it was sold was ¼d. less per gallon. The stock at the end of the year was lower, I am glad to say, at 30,192 gallons against 41,509 gallons at the beginning of the year.

The total gross revenue amounts to £141,287 12s. 6d., or an increase of £3,690, and the working profit comes out at £22,847 10s. 4d. This is less than last year by £1,386, but in the light of the facts which I have given to you regarding transfer of capital charges to revenue and the lesser sum of Indian income tax relief received this year the figure may be considered very satisfactory.

Turning to the net revenue account, exchange is less by £861, due to less cash having been available in Bombay for remittance owing to the expenditure on refrigerators which are paid for in Bombay and to the smaller sum from the relief of Indian income-tax. You will see that we have added £2,434 to the reserve fund and £483 to the renewal fund, making the total of these two funds over £61,000. This is double what it was twenty years ago and affords ground for confidence in the continued prosperity of the Company. After all these adjustments and appropriations there remains a balance on account of the year under review of £24,809. We have already distributed an interim dividend of 3½% (less income-tax), which absorbed £10,500, and we are now recommending a final dividend of 4½% (less income-tax), which will absorb £13,500 and leave a sum of £809 to be added to the amount brought forward from last year of £44,954, making a total sum of £45,763 13s. 6d. to be carried forward.

The balance-sheet, I think, speaks for itself. The cash balances are lower by £1,772 because of the abnormal expenditure on capital requirements. The investments are slightly lower so as to bring them in at the mesne market value. Amounts owing to the Company are increased by £2,111, due to the larger sale of gas in December and to the heavy sale of fittings during that month, but most of these outstandings have since been collected.

Prospects.

I do not propose to say anything as to the prospects of the Company, because the political crisis through which India is passing must render any prophecy more or less guess work; but so far as our own Company is concerned I can give you the assurance that you have a loyal and competent staff devoted to the interests of the concern and determined to maintain its prosperity so far as lies in their power. Your Indian work people have demonstrated their loyalty on many occasions, and we have every reason to believe that they recognize that their interests are bound up in the well-being of the institution which they serve. Our works are certified by our General Manager to be amply sufficient and in first rate order, and his statement on this head is supported by gentlemen from this country well versed in the manufacture of gas who have paid visits to our works. Moreover, our business has been increasing this year in a most satisfactory way. But at the same time we must realize that the changes which were made by the Government of India Act, 1935, constitute the most stupendous experiment in the Government of any dependent country ever tried or indeed contemplated, and we can only look on with pride and admiration at the courage and generosity of our Country and Empire which is offering to a subject race an opportunity of self-government with the hope and prayer that all classes of our fellow subjects in India may recognize the nobility and the goodwill of the offer which is held out to them and may profit by it and reciprocate the friendly and noble spirit which has prompted the offer. Confidence begets confidence, and a wise and noble attitude invites a similar response. And it may be, indeed I believe it will be, that for the first time in the history of Nations we shall see a national fulfilment of the almost inspired prediction which the great American Quaker Poet, John Greenleaf Whittier, addressed to his individual countrymen in those immortal lines which he wrote:

> "Be noble and the Nobleness
> Which dwells in all men
> Sleeping, perhaps, but never dead
> Shall rise in majesty to meet thine own."

That it may be so is the desire and hope of us all.

The Chairman then moved:

> "That the Report of the Directors and the audited Statement of Accounts for the year ended Dec. 31, 1936, presented to the meeting, be, and the same are hereby, received, approved, and adopted."

The DEPUTY-CHAIRMAN (Mr. H. H. Macleod) seconded the resolution, which was carried unanimously.

Dividends.

It was thereafter moved by the CHAIRMAN, seconded by Mr. STANLEY H. JONES, and unanimously agreed:

> "That a final dividend for the year ended Dec. 31, 1936, of 4½% (less income-tax at the rate of 2s. 7·58d. in the £) be now declared, payable on and after May 6, 1937, making with the interim dividend of 3½% (less income-tax) a dividend of 8% (less income-tax) for the year."

Re-Election of Directors and Auditors.

Moving the re-election to the Board of Mr. W. G. Bradshaw and Mr. S. H. Jones, being the Directors retiring by rotation, Mr. A. M. PADDON reminded the shareholders that the excellence of the statement presented to them that day was largely occasioned by the services of these two gentlemen. Both of them, for a long term of years, had been responsibly associated with gas administration—and successful gas administration. Mr. Paddon could personally only speak with knowledge of the affairs of their Company for the last ten years; but he recalled that when he first became a Director they owed the Bank £34,000 and that the capital per million was in excess of £1,000. What they had heard that day, added Mr. Paddon, constituted the most valuable tribute to the services they had both rendered, and the meeting would only be doing the just and wise thing in re-electing them.

The resolution was seconded by the DEPUTY-CHAIRMAN and carried unanimously; and the CHAIRMAN and Mr. S. H. JONES briefly returned thanks for their re-election.

On the proposition of Mr. A. DICKSON, seconded by Mr. F. R. SMITH, the Company's Auditors (Mr. Alfred Morland, F.C.A., and Mr. Frederick John Bradfield, F.C.I.S.) were re-appointed at the same remuneration as heretofore.

Mr. BRADFIELD briefly acknowledged this renewal of their confidence on behalf of his colleague and himself.

Votes of Thanks.

The CHAIRMAN went on to say that the most pleasant part of his duties was now to propose a hearty vote of thanks to all the Officers and staff of the Company from the highest to the lowest both in Bombay and London. They all contributed their quota towards the smooth working of the concern and towards the furtherance of the prosperity of the Company. Mr. Lane, their veteran General Manager and Engineer in Bombay, continued to give of his best for the benefit of the Company, although its growth brought him more work and heavier responsibilities. He was ably assisted by Mr. Boulter, the Assistant Manager and Engineer, and also, for part of the year, by Mr. W. E. Gladstone, the Deputy Assistant Manager and Engineer. The other European Officers to whose services he had more than once in past years made favourable reference continued to serve the Company in the most efficient and zealous manner. The Indian staff were spoken of highly by Mr. Lane for their loyalty and good work and conduct. As the shareholders were aware, their interests were well cared for by the Company, and they recognized and appreciated that fact and gave freely of their best in return. As to their London staff, no one could wish for more efficient and enthusiastic workers, and the Chairman gladly bore his testimony to the assistance which they constantly gave to the Board. He would specially mention their able Secretary, who never wearied of his strenuous and successful endeavours to further the interests of the Company in every way open to him.

The vote of thanks was seconded by the DEPUTY-CHAIRMAN and heartily accorded.

The SECRETARY, in responding to the vote of thanks, said that the appreciative remarks which he had just heard would act as a spur to the whole staff, as there was nothing so helpful in one's work as encouragement. They all received that help from their esteemed Chairman, and it was a pleasure to work with him and his colleagues. On behalf of Mr. Lane and his European and Indian staffs and his own small but energetic staff he thanked the meeting for the vote.

Mr. F. W. CRUTTENDEN remarked that it would be ungrateful to leave the meeting without acknowledging their thanks to the Chairman for his impressive and exhaustive review of the Company's affairs. In this vote of thanks he included the other members of the Board of Directors, adding that they on that side of the table thoroughly endorsed all that had been said in regard to the services of the staff.

Mr. BERTRAM ELLIS, in seconding the vote, observed that they were to be congratulated on the fact that Mr. Bradshaw, with his long experience in law, company management, and finance, was renewing his term of office as Chairman. He would like, in seconding the resolution, to express their appreciation to him and to the whole Board of Directors for their care of the shareholders' interests during the past year.

The CHAIRMAN briefly acknowledged the vote of thanks, and the meeting then terminated.

Athletic and Social

Gas Undertakings' Small Bore Rifle League.

We publish below the final league table of the Gas Undertakings' Small Bore Rifle League for the season 1936-37:

Team.	Shot.	Won.	Lost.	Drawn.	Points.	Aggregate
Portsmouth "A"	18	16	2	..	32	10,641
Hull "A"	18	14	4	..	28	10,542
Beckton "A"	18	13	4	1	27	10,524
Portsmouth "B"	18	13	5	..	26	10,537
Folkestone	18	8	9	1	17	10,450
Beckton "B"	18	7	11	..	14	10 325
Harrow	18	6	12	..	12	9 728
Hull "B"	11	6	5	..	12	5,942
Cambridge	18	3	15	..	6	10,224
Tottenham	6	2	4	..	4	3,446

HIGHEST INDIVIDUAL SCORERS.

G. Renardson (Hull "A"), average 18 matches. . 99·55
G. Davis (Portsmouth "A"), ,, ,, ,, . . 99·06

Swansea Superannuation and Co-Partnership Schemes.

At the annual general meetings of the Swansea Gas Light Company's Superannuation and Co-Partnership Schemes, held on April 28, the Chairman of the Company, Mr. E. H. Leeder, presided. He was supported by Messrs. J. F. Coonan and Ernest Davies, Directors, and by Mr. W. H. Johns, Engineer and Manager, and Mr. Ernest Ablett, Secretary.

In the course of his remarks, prior to moving the adoption of the accounts, Mr. Leeder said that he thought the members of the Superannuation Scheme should be very proud of the scheme, which had been inaugurated 13 years ago, and which to-day had a fund value of over £33,000. The scheme had stood the practical test of time, and 46 old employees of the Company had been in receipt of pensions during the past year. He was very happy to say that experience had proved that, in the majority of cases, it had been followed by improved health, and both he and the meeting gave a very cordial welcome to those pensioners who were present at the meeting. He expressed the opinion that the principle of providing superannuation schemes for their workers might be advantageously adopted by other industries.

Referring to the accounts of the Co-Partnership Scheme, Mr. Leeder reviewed the Company's position during the past year, and the difficulties arising from increased prices of coal and of raw materials, which would have to be dealt with during the coming months. These remarks were amplified by Mr. W. H. Johns and Mr. A. H. Shepherd, who discussed various details of the Company's programme to induce gas sales.

Elections to various offices were made, and cordial votes of appreciation were expressed to the Committees and Trustees of both schemes, on whose behalf Mr. Ernest Ablett returned thanks.

At the conclusion of the meeting, Mr. Ernest Davies proposed a very warm vote of thanks to the Chairman for presiding.

Chester Co-Partnership Dinner.

Two employees of the Chester United Gas Company who have completed 50 years' service were guests of honour at the Co-partnership dinner at the Bars Hotel on April 22, and were made the recipients of gifts in commemoration of their long association with the Company. Mr. Richard Farmer presided and was supported by his fellow-Directors, Messrs. W. Cullimore, L. M. Synge, H. P. Gamon, and A. O. Roberts, Messrs. H. Hopkinson (Secretary), T. L. Jones (Assistant Secretary), J. H. Noble (Engineer), James Henshall (Auditor), C. W. Rogers (Solicitor), G. B. Jones (Works Manager I.C.I. Dyestuffs Group at Huddersfield), and J. A. Mulvey.

The Chairman then made presentations to Mr. Alfred Bellis and Mr. William Caton, who had each served 50 years with the Company. The Directors had been glad to join with them in making presentations to their friends, and he had great pleasure in asking Mr. Caton to accept a grandfather clock, with Cambridge chimes, and a silver tea service, and Mr. Bellis a gold watch and a mantel clock.

Mr. Caton and Mr. Bellis expressed their great appreciation of the gifts, referring to the happy days they had spent in the service of the Company.

Mr. G. B. Jones, proposing "The Company and its Co-partnership Scheme," said he owed a great deal to the training he received at the Chester Gas-Works. They were fortunate in having such a successful Co-partnership Scheme. In a public utility company there were three parties—the shareholders and the directors, the staff and workers, and the consumers and customers. They had all to work together as a team to ensure prosperity, and that team spirit prevailed there in a marked degree.

Mr. Synge, responding, said he thought he could say that the Directors of the Company represented not only the shareholders, but the officials, the staff, and the consumers. They tried to look after the interests of all.

Mr. Hopkinson submitted "The Chairman and Directors of the Company." Mr. Ambrose Roberts, replying, said the Industry was of vital importance to the health and happiness of the nation. Difficulties in conducting the business were growing. The question of coal prices was serious, and the Board had shown great enterprise in adopting, under the guidance of Mr. Noble, new plant, which had enabled them to continue to supply the public without any increase in the price of gas, and that was a great achievement. No one could have the interests of the Company more at heart than Mr. Hopkinson, and they all endeavoured to cultivate the enthusiasm he displayed.

Mr. Noble proposed "The Artistes."

Standard sizes of

STANTON PIPES

always in stock

"New" Spun Iron Pipes

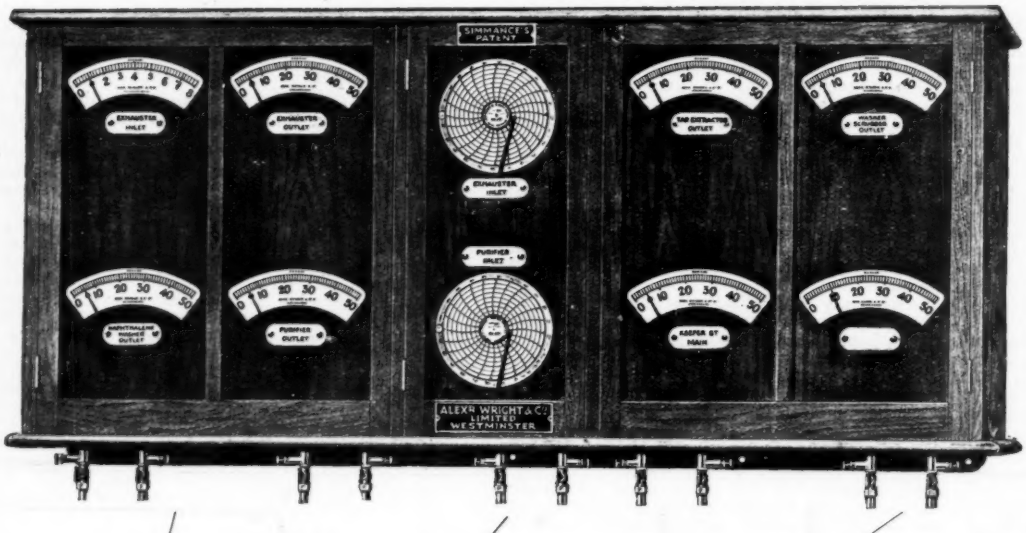
12 Feet Lengths	18 Feet Lengths
DIAMETER INS.	DIAMETER INS.
3	—
4	4
6	6
7	7
8	8
9	9
10	10
12	12

Vertically-cast Pipes

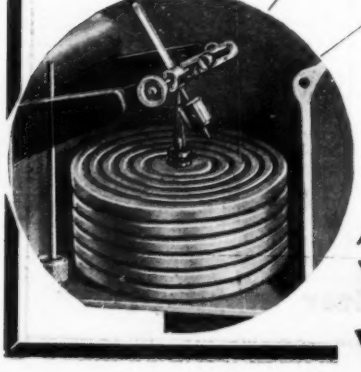
9 Feet Lengths	12 Feet Lengths
DIAMETER INS.	DIAMETER INS.
3	—
4	4
6	6
8	8
9	9
10	10
12	12
	15
	18
	24

The Stanton Ironworks Company Limited, Near Nottingham

DEVELOPING THE IDEA



For thirty years we have been developing the idea which originated Simmance Patent Dead-Beat Recorders and Indicators. These Instruments are well-known and widely used. Here is an example of the development of the idea of bringing together a number of units into one cabinet. A very sound idea, and one which could be developed to your advantage.



ALEXANDER
WRIGHT & CO., LTD.
WESTMINSTER, S.W.1

Gas Markets and Manufactures

Stock Market Report

(For Stock and Share Lists, see later pages)

The Chancellor's further statement on his N.D.C. proposals allayed somewhat the anxieties felt the previous week on this matter, and prices on the Stock Exchange would doubtless have taken a turn for the better last week were this the only disturbing factor. Unfortunately a collapse of speculation in mines resulted in heavy liquidation and a consequent big drop in prices, a position which also spread to the industrial section. Even gilt-edged and home rails which have recently been strong features failed to withstand the general weakness, and many quotations closed anything from ½ to 2 points lower. A little more cheerfulness was apparent on Friday, though this came too late to make much impression on prices, and as some nervousness exists regarding this week's Settlement, to be followed by the Coronation holiday period, it seems likely that some little time must elapse before markets regain their accustomed activity.

The volume of business in the Gas Market was much smaller than usual though prices generally, compared with the reactions in other departments, were well maintained. The section has really weathered the storm of the past fortnight quite successfully. There were only two set-backs of any note last week—viz., Imperial Continental and, in the Unofficial List, Shanklin and Ventnor both closing 7 points lower. On the other hand, Newcastle units on the local exchange advanced a further 3d. to 25s. 3d., and Montevideo stock hardened 2 points to 87½.

The accounts of the Cape Town and District Gas Light and Coke Company, Ltd., for the year to December last show a small improvement on those for 1935. The balance of the revenue account is £16,733 (against £14,774), and, after making provision for interest and debenture redemption, there remains a balance of £2,083 (against £1,433), which the Directors propose to carry forward. The report states that the profit would have been greater but for the further increase in the costs of coal and imported gas appliances. No dividend has been distributed on the £10 ordinary shares since 1932 when 5% was paid, and no preference dividend since Nov. 1, 1933. The last recorded transaction in the ordinary shares was in October last at 30s.

Current Sales of Gas Products

The London Market for Tar Products.

May 3.

To-day's prices for Tar Products are as under:
Pitch, 36s. to 37s. per ton f.o.b.
Creosote, 6d.
Refined tar, 3¾d.
Pure toluole, 2s. 4d. to 2s. 5d.; pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, about 1s. 8d.; and 90/160 pyridine, about 9s.—all per gallon naked at makers' works.

Tar Products in the Provinces.

May 3.

The average prices of gas-works products during the week were: Gas-works tar, 22s. 3d. to 27s. 3d. Pitch—East Coast, 35s. to 36s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 35s. to 36s.* Toluole, naked, North, 2s. to 2s. 1d. Coal tar crude naphtha, in bulk, North, 8½d. to 9d. Solvent naphtha, naked, North, 1s. 6¼d. to 1s. 6½d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 5d. to 5¼d.; low gravity, 4⅝d. to 4¾d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 3s. 6d. to 3s. 9d. Naphthalene, £18 to £20. Salts, 90s. to 95s., bags included. Anthracene "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be neecssary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *May* 1.

New business is somewhat restricted for want of prompt supplies. Prices are well maintained in all departments.

Crude gas-works tar.—The actual value is 36s. to 37s. per ton *ex* works in bulk.

Pitch.—Business is confined to small quantities for home trade and prices can be taken at about 30s. to 32s. 6d. per ton f.o.b. Glasgow for export, and 30s. per ton *ex* works in bulk for home trade.

Refined tar is changing hands in quite large quantities at round 3d. to 3¼d. per gallon free on rails for export, and 3½d. to 3¾d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil.—A good steady throughput is being maintained. To-day's values are as follows: Specification oil, 5¼d. to 5⅜d. per gallon; low gravity, 5⅜d. to 6d. per gallon; neutral oil, 5¼d. to 5½d. per gallon; all *ex* works in bulk.

Cresylic acid.—Practically no supplies are available in this district so that prices are quite nominal as under: Pale, 97/99%, 4s. 3d. to 4s. 5d. per gallon; dark, 97/99%, 4s. to 4s. 2d. per gallon; and pale, 99/100%, 4s. 8d. to 4s. 11d. per gallon; all *ex* works in buyers' packages.

Crude naphtha is only available in small quantities and readily commands round 6d. to 6½d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—90/160 grade is valued at 1s. 4½d. to 1s. 5½d. per gallon. and 90/190 heavy naphtha at 11d. to 1s. per gallon.

Motor benzole is moving quite readily at 1s. 4d. to 1s. 4½d. per gallon.

Pyridine. Prices are nominal at 7s. to 8s. per gallon for 90/160 grade, and 8s. to 9s. per gallon for 90/140 grade.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole . . .	0 10	to	0 10½	per gallon at works
Motor ,, . . .	1 3½	,,	1 4	,, ,, ,,
90% ,, . . .	1 4½	,,	1 5	,, ,, ,,
Pure ,, . . .	1 8½	,,	1 9	,, ,, ,,

Contracts Advertised To-Day

Coal.

Workington Gas Department. [p. 296.]
Yeovil Gas Department. [p. 296.]

Purifiers.

Rotherham Gas Department. [p. 296.]

Weighbridge.

Southport Gas Department. [p. 296.]

Gas Undertakings' Results

Cape Town.

The report of the Directors of the Cape Town and District Gas Light and Coke Company for the year ended Dec. 31, 1936, states the balance at credit of revenue account is £16,733, which, with the sum of £1,433 brought in, makes a total of £18,166. This balance is higher by £1,959 compared with the corresponding figure for 1935; the increase would have been greater but for the fact that the cost of coal again rose and the prices of gas appliances and other commodities which have to be imported into the Union also increased. After making provision for debenture, &c., interest and debenture redemption fund there remains the sum of £2,083, which the Directors propose should be carried forward. The extensions of mains to which reference was made in last year's report have made possible an increase in the volume of gas sold of 5·37%. This increase has been entirely in the use of gas for industrial purposes. Domestic consumers, both ordinary and prepayment, showed a falling off in numbers, but many of these accounts were unprofitable. In order to meet the competition of electricity which continues to be supplied for domestic consumption at an exceedingly low rate, free service and maintenance of gas-consuming appliances have been extended. The Directors are assured that the goodwill of the Company's business is well maintained and that working is as efficient, and as economical, as possible, having regard to the conditions in which the Company's undertaking has to operate. During the year the Company's Engineer and General Manager visited London and consulted with the Directors. It was decided to make certain retrenchments, which took effect in the latter part of the year. It is hoped that in a full year larger savings may be possible,

GLOVER-WEST

NEW VERTICAL RETORT PLANTS NOW IN SERVICE

SOUTHEND-ON-SEA

Due regard is paid to the amenities of the district in the striking external design of the new Glover West vertical retort installation for the Gas Light and Coke Co. at Southend-on-Sea. Gas-making in this plant began on March 4th, 1937.

THE SOCIETY OF BRITISH GAS INDUSTRIES · 1905 ·

For large-scale production

and equally for the works of small or medium output, the Glover-West System of continuous carbonization in vertical retorts offers a means of gas and coke production in the best interests of the undertaking and of the community. In efficiency of operation Glover-West plant represents modern practice at its best.

400 plants in 24 countries

WEST'S GAS IMPROVEMENT CO., LTD.

MANCHESTER: ALBION IRONWORKS, MILES PLATTING ■ **LONDON:** COLUMBIA HOUSE, ALDWYCH, W.C. 2

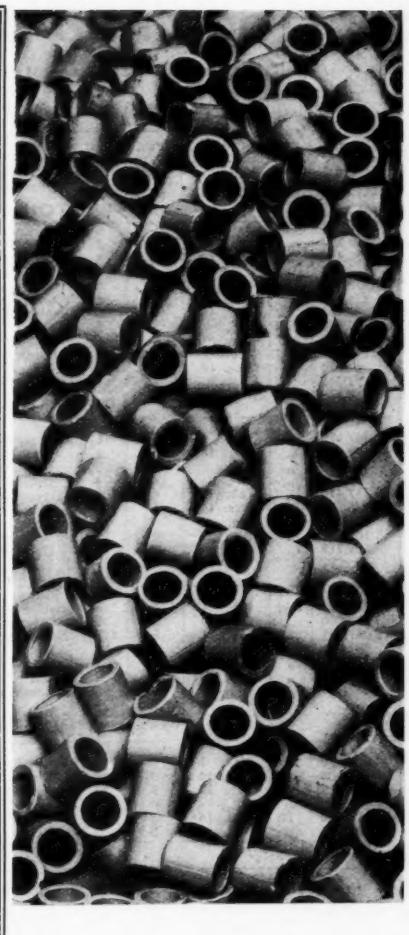
STOCK AND SHARE LIST

Official Quotations on the London Stock Exchange

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Apl. 30.	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
1,767,439	Stk.	Mar. 15	8	8	Alliance & Dublin Ord. ...	162—167	...	...
374,000	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	96—101	...	...
558,890	,,	Feb. 15	7	7	Barnet Ord. 7 p.c.	160—165	...	...
300,000	1	Apl. 5	1/4⅛	1/9⅜	Bombay, Ltd.	25/6—27/6	...	...
179,915	Stk.	Mar. 1	9½	9½	Bournemouth sliding scale ...	195—205	...	...
590,407	,,	,,	7	-	Do. 7 p.c. max. ...	161—166	−2	161½—163½
493,960	,,	,,	5	6	Do. 6 p.c. Pref ...	133—138	...	134½—135
50,000	,,	Dec. 14	-	3	Do. 3 p.c. Deb. ...	80—85	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	100—105	...	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	117—122	...	...
357,900	,,	Feb. 15	7½	7½	Brighton, &c., 6 p.c. Con. ...	155—160	...	...
649,955	,,	,,	6¾	6¾	Do. 5 p.c. Con. ...	138—143	−2	140
205,500	,,	,,	6	6	Do. 6 p.c. 'B' Pref.	130—135	...	...
855,000	,,	Mar. 1	7	8	British Ord.	150—155	...	149
100,000	,,	Dec. 14	7	7	Do. 7 p.c. Pref.	143—148	...	...
350,000	,,	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	95½
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	103—108	...	...
450,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100,000	10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1¼—3¼	...	...
150,000	Stk.	Jan. 4	4½	4½	Do. 4½ p.c. Deb. ...	80—85	...	...
626,860	,,	Feb. 1	6	6	Cardiff Con. Ord.	120—125	...	...
237,860	,,	Dec. 14	5	5	Do. 5 p.c. Red. Deb.	107—112	...	...
98,936	1	Apl. 5	2/-	2/-	Colombo Ord.	1⅞—1¾	...	...
24,510	1	,,	1/4⅛	1/4⅛	Do. 7 p.c. Pref. ...	23/—25/-	...	...
739,453	1	Mar. 15	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	17/—19/-	...	...
296,144	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	22/—24/-	...	...
1,775,005	Stk.	Feb. 1	5	5	Commercial Ord.	88—93	...	91½
620,000	,,	Nov. 30	3	3	Do. 3 p.c. Deb. ...	73—78	...	73—75½
286,344	,,	Feb. 15	5	5	Do. 5 p.c. Deb. ...	115—120	...	...
807,560	,,	Feb. 15	7	7	Croydon sliding scale ...	141—146	−1	145½—146½
644,590	,,	,,	5	5	Do. max. div.	109—114	...	111½
620,385	,,	Dec. 14	5	5	Do. 5 p.c. Deb.... ...	115—120	...	...
239,000	,,	Feb. 1	5	5	East Hull Ord. 5 p.c....	100—105	...	...
185,355	,,	Feb. 15	6	6	East Surrey Ord. 5.p.c. ...	122—127	...	...
176,211	,,	Dec. 14	5	5	Do. 5 p.c. Deb. ...	113—118	...	...
250,000	1	Nov. 16	6	4	Gas Consolidation Ord. ...	20/—22/-	...	...
250,000	1	,,	4	4	Do. 4 p.c. Red Cum. Pref.	19/—21/-	...	19/—19/6
19,255,284	Stk.	Feb. 1	5⅞	5⅞	Gas Light & Coke 4 p.c. Ord.	25/6—26/6a	...	25/9—26/4½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	80—83	+1	80—83
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	100—103	...	101—102
8,602,497	,,	Nov. 30	3	3	Do. 3 p.c. Con. Deb. ...	78—81	...	79—80¼
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	110—113	...	114
3,500,000	,,	,,	4⅛	4⅛	Do. 4⅛ p.c. Red. Deb....	108—111	...	110—111
700,000	,,	Mar. 1	25/5§	3½	Do. 3½ p.c. Red. Deb....	98—101	...	100—100½
270,466	,,	Feb. 15	6	6	Harrogate New Cons. ...	122—127	...	...
213,200	,,	Feb. 15	6	6	Hornsey Con. 3½ p.c. ...	120—125	...	...
5,600,000	,,	Nov. 2	12	8	Imperial Continental Cap. ...	150—155	−7	151—159
223,130	,,	Feb. 1	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...	...
285,242	,,	Mar. 1	8½	8½	Lea Bridge 5 p.c. Ord. ...	160—165	...	...
11,751	,,	Mar. 1	8	10	Maidstone Gas 5 p.c. Cap. Stk.	180—190	...	...
63,480	,,	Dec. 14	3	3	Do. 3 p.c.Prp.Db.Sk.	72—77	...	...
75,000	,,	Nov. 30	†10	†10	Malta & Mediterranean ... Metropolitan (of Melbourne)	150—160	...	...
392,000	—	Apl. 1	5½	5½	5½ p.c. Red. Deb.	98—103	...	...
231,978	Stk.	Feb. 15	5	5	M.S. Utility 'C' Cons. ...	102—107	...	...
968,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	95—100	...	97½—98¾
360,075	,,	Dec 14	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
148,955	,,	,,	5	†5	Do. 5 p.c. Deb. ...	115—120	...	...
125,000	—	Jan. 4	3½	3½	Do. 3½ p.c. Rd.Rg.Bds.	97—100	...	...
675,000	Stk.	Nov. 16	†6	†6	Montevideo, Ltd.	85—90	+2	89
250,000	,,	Feb. 15	7½	7½	North Middlesex 6 p.c. Con.	160—165	...	...
396,160	,,	Feb. 1	5	5	Northampton 5 p.c. max. ...	102—107	...	...
300,000	,,	Apl. 19	†9	†7	Oriental, Ltd....	162—167	...	...
416,617	,,	Dec. 14	8	8	Plymouth & Stonehouse 5 p.c.	165—170	...	...
621,667	,,	Feb. 15	8¼	8¼	Portsmouth & Gosport Cons.	167—172	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	105—110	...	...
73,350	,,	,,	...	5	Do. 5 p.c. Pref. ...	112—117	...	...
363,470	1	Sept. 21	1/-	1/-	Severn Val. Gas Cor. Ld. Ord.	20/—22/-	...	...
454,510	1	Mar. 15	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	20/—22/-	...	...
133,201	Stk.	Feb. 15	5	8½	Shrewsbury 5 p.c. Ord. ...	133—138	...	...
90,000	10	June 8	†3½	‡4	South African...	4—5	...	...
1,152,635	1	Sept. 7	1/2½	1/2½	South East'n Gas. Cn.Ld. Ord.	24/—26/-	...	25/1½
845,511	1	Mar. 1	-/10⅜	-/10½	Do. 4½ p.c. Red. Cum. Pref.	20/—22/-	...	20/—20/9
200,000	1	,,	4	4	Do. 4 p.c. Cum. Pref. ...	19/6—21/6	...	20/-
450,000	,,	Feb. 15	4	4	Do. 4 p.c. Deb.	100—102	...	...
150,000	Stk.	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	99—101	...	...
6,709,895	,,	Feb. 1	5	6	South Met. Ord.	107—112	...	107½—109¾
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	132—137	...	132¾
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	96—101	...	98
1,895,445	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	74—79	...	76
1,000,000	,,	Jan. 4	5	5	Do. 5 p.c. Red. Deb....	107—112	...	111
1,543,795	,,	Feb. 1	6	6	South Suburban Ord. 5 p.c....	122—127	...	...
512,825	,,	,,	5	5	Do. 5 p.c. Pref....	112—117	...	114½
500,000	,,	,,	4	4	Do. 4 p.c. Pref....	95—100	...	...
888,587	,,	Dec. 14	5	5	Do. 5 p.c. Deb....	115—120	...	115¾—118
250,000	,,	,,	4	4	Do. 4 p.c. Deb....	98—103	...	...
427,859	1	Nov. 16	1/2⅜	9¾	S. Western Gas & Watar Ord.	19/—21/-	...	...
160,523	1	Apl. 19	-/10⅜	-/10⅜	Do. 4½ p.c. Red. Cum. Pf.	20/—22/-	...	...
110,000	Stk.	Dec. 14	4	4	Do. 4 p.c. Red. Deb. ...	98—103	...	...
750,541	,,	Feb. 1	5	5½	Southampton Ord. 5 p.c. ...	111—116	...	111—112
148,836	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	98—103	...	...
350,000	,,	Feb. 15	5½	5½	Swansea 5½ p.c. Red. Pref. ...	110—115	...	...
106,000	,,	Jan. 4	6½	6½	Do. 6½ p.c. Red. Deb. ...	98—101	...	...
94,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
1,076,490	,,	Feb. 15	6⅝	6⅝	Tottenham and District Ord.	137—142	...	...
409,835	,,	,,	5½	5½	Do. 5½ p.c. Pref....	123—128	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
371,850	,,	Nov. 30	4	4	Do. 4 p.c. Deb. ...	98—103	...	...
373,939	,,	Feb. 15	7	7	Uxbridge, &c., 5 p.c. ...	142—147	...	...
133,010	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
1,371,138	,,	Feb. 1	7	7	Wandsworth Consolidated ...	142—147	...	145
1,620,615	,,	,,	5	5	Do. 5 p.c. Pref ...	113—118	...	116—116½
500,000	,,	,,	33/4	4	Do. 4 p.c. Pref. ...	95—100	...	99
1,343,964	,,	Dec. 14	5	5	Do. 5 p.c. Deb. ...	117—122	...	121
383,745	,,	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...	...
558,342	,,	Feb. 1	7	7	Watford and St. Albans Ord.	142—147	...	...
200,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
200,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	123—128	...	...
200,000	,,	Dec. 14	4	4	Do. 4 p.c. Red. Deb.	97—102	...	...
100,000	,,	,,	3½	3½	Do. 3½ p.c. Red.Deb.	95—100	...	...

a.—The quotation is per £1 of Stock. * Ex div. † Paid free of income-tax. ‡ For year. § Actual.

Stock and Share List continued overleaf.



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Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. Apl. 30.	Rise or Fall on Week.	Transactions, Lowest and Highest During the Week.
BRISTOL EXCHANGE.								
347,756	Stk.	Feb. 1	5	6	Bath Cons.	120—122	...	...
1,667,250	,,	Feb. 15	5	5	Bristol, 5 p.c. max.	113—115	...	...
120,420	,,	Dec. 14	4	4	Do. 1st 4 p.c. Deb. ...	101—103	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	101—103	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	122—125	...	...
274,000	,,	Mar. 1	5	5	Newport (Mon.) 5 p.c.max. ...	103—108	...	...
13,200	12	Mar. 15	7	8	Pontyp'l Gas & W. 10 p.c. 'A'	13½—14½	...	...
13,600	10	,,	5	6	Do. 7 p.c. 'B'	12½—13½	...	...
40,000	10	,,	5	6	Do. 7 p.c. 'C'	12—12½	...	...
140,778	Stk.	Feb. 1	5	5	Weston-super-Mare Cons. ...	112—113	...	...
64,338	,,	Dec. 14	4	4	Do. 4 p.c. Deb.	98—101	...	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	160—163	...	...
LIVERPOOL EXCHANGE.								
157,150	Stk.	Feb. 1	5	6½	Chester 5 p.c. Ord.	106—111	...	...
92,500	,,	Dec. 14	4½	4	Do. 4 p.c. Pref.	98—102	...	...
36,430	,,	,,	3	3½	Do. 3½ p.c. Deb.... ...	90—95	...	...
41,890	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	99—103	...	...
2,167,410	,,	Feb. 15	6	6	Liverpool 5 p.c. Ord. ...	124—126	−½	...
245,500	,,	Dec. 14	5	5	Do. 5 p.c. Red. Pref. ...	101—106	...	...
306,083	,,	Jan. 4	4	4	Do. 4 p.c. Deb. ...	103—105	...	...
106,280	,,	Feb. 1	10	10	Preston 'A' 10 p.c.	210—220	...	...
188,219	,,	,,	7	7	Do. 'B' 7 p.c.	150—160	...	...
NEWCASTLE EXCHANGE.								
122,577	Stk.	Feb. 1	8	8	Blyth 5 p.c. Ord.	166—168	...	...
732,000	,,	Feb. 15	5	5	Hartlepool G. & W. Co. & New	125—127	...	...
2,061,315	,,	Feb. 1	5	5¾	Newcastle & Gateshead Con.	25/—25 6*d*	+/3	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	99—101	...	...
776,706	,,	Jan. 4	3½	3½	Do. 3½ p.c. Deb. ...	90—95	−2½	...
277,285	,,	Nov. 2	5	5	Do. 5 p.c. Deb. '43...	108—109	...	...
332,351	,,	Feb. 1	6	6	Sunderland 6 p.c. max. ...	139—141	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Mar. 1	7	9	Derby Con.	160—180	...	...
55,000	,,	Dec. 14	4	4	Do. 4 p.c. Deb.	100—105	...	...
84,750	,,	Feb. 17	5	12	Long Eaton 'A' Ord. ...	...	...	...
50,000	,,	,,	4	10	Do. 'B' Ord. ...	...	...	...
20,000	10	Dec. 14	5	5	Do. 5 p.c. Pref. ...	10—12	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Aug. 10	10	10	Great Grimsby 'A' Ord. ...	210—220	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	210—220	...	...
79,000	,,	,,	10	10	Do. 'C' Ord. ...	205—210	...	...
1,806,339	,,	Feb. 15	6	6½	Sheffield Cons.	143—145	...	...
95,000	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	101—104	...	...

Supplementary List of Stocks and Shares not Officially Quoted

202,152	Stk.	Mar. 15	25/-*b*	25/-*b*	Ascot Ord.	102—107	...	...
128,182	,,	Jan. 4	5	5	Do. 5 p.c. Pref.	110—115	...	...
312,083	1	Nov. 16	5	5	Assd. Gas and Water Ord. ...	19/6—21/6	...	20/9—21/-
326,071	1	,,	4½	4½	Do. 4½ p.c. Cum. Pref. ...	19/6—21/6	...	...
150,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	97½—98
17,000	,,	Feb. 15	8	8	Bognor Orig. Ord. 'A' ...	160—170	...	...
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	160—170	...	...
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	140—145	...	...
37,440	,,	Feb. 1	10	10	Cam. Univ. & Town 10 p.c.max.	195—205	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	137—142	...	...
39,025	,,	,,	5	5	Do. 5 p.c. max.	98—103	...	...
65,000	,,	Mar. 1	7½	8½	Eastbourne 'A' 5 p.c. ...	160—165	...	...
198,000	,,	,,	6	7	Do. 'B' 3½ p.c.	130—140	...	...
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
130,000	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	115—120	...	...
24,000	30	Feb. 1	8½	8½	Great Yarmouth 8½ p.c. max.	45—50	...	...
59,400	30	,,	7½	7½	Do. 7½ p.c. max.	40—45	...	...
51,160	Stk.	Dec. 14	5½	5½	Do. 5½ p.c. Deb.	122—127	...	...
152,600	,,	Feb. 15	8	9	Guildford Cons.	190—200	...	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	112—117	...	...
68,250	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	115—120	...	...
156,600	,,	Feb. 15	7½	7½	Hampton Court Cons. ...	150—160	...	...
107,960	10	Mar. 15	4	5½	Mid Kent Ord.	9—10	...	...
230,940	Stk.	Feb. 15	10	10	Oxford & District Ord. ...	200—210	...	...
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	112—117	...	...
126,193	,,	Nov. 16	7½	7½	Peterborough Ord.	162—172	...	...
64,990	,,	Mar. 15	6¾	7½	Redditch Ord.	127—137	...	...
166,850	,,	Feb. 15	8	8	Romford Ord.	157—167	...	...
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100	...	...
44,000	,,	Mar. 15	5	5	Do. 5 p.c. Deb.	115—120	...	...
10,950	,,	Mar. 1	8	8	Ryde Ord.	160—165	...	...
136,191	,,	Feb. 15	5	7	Scarborough Ord.	123—133	...	...
27,825	,,	Feb. 1	8	8	Shanklin & Ventnor Cons. ...	158—168	−7	...
270,086	,,	Mar. 15	7	7	Slough Ord.	137—142	...	...
21,000	,,	Dec. 14	5	5	Do. 5 p.c. Deb.... ...	113—118	...	...
28,872	1	Nov. 2	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—22/-	...	...
28,866	1	Mar. 15	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...	...
137,730	Stk.	Feb. 15	7	7	Southgate & Dist. 7 p.c. max.	135—145	...	...
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
117,228	,,	Feb. 15	6	5	Swindon Cons.	108—113	...	...
60,425	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	113—118	...	...
64,380	,,	Dec. 14	5	5	Torquay and Paignton 5 p.c. Pf.	115—120	...	...
750,000	1	Apl. 5	4	6	Utd. Kingdom Gas Cpn. Ord.	20/—22/-	...	21/—21/9
936,338	1	Nov. 16	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	20/—22/-	...	20 3—20 10½
674,084	1	Apl. 5	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pref.... ...	18/6—20/6	...	19/3—19/6
600,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—101	...	97½
130,000	,,	Feb. 15	5	8	Wakefield Ord.	132—137	...	...
81,650	,,	,,	5	5	Do. 5 p.c. max.	103—108	...	...
82,000	,,	Feb. 1	6	6	Weymouth Ord.	103—108	...	...
98,384	,,	Feb. 1	6	6	Wolverhampton 6 p.c. Pref....	125—130	...	...
160,000	,,	Dec. 14	5½	5½	Do. 5½ p.c. Rd. Db	110—115	...	...
370,000	,,	Feb. 15	4	6	York Cons.	105—110	...	...
90,000	,,	Dec. 14	5	5½	Do. 5 p.c. Red. Deb. ...	105—110	...	...
133,640	,,	Mar. 1	6½	6½	Yorktown (Cam.) 5 p.c ons.	130—135	...	...
120,000	,,	,,	5	5*	Do. 5 p.c. Pref.	110—115	...	...
35,000	,,	Dec. 14	5½	5½	Do. 5½ p.c. Deb.	125—130	...	...

a The quotation per £1 of Stock. *b* Actual for Quarter. * Ex div.

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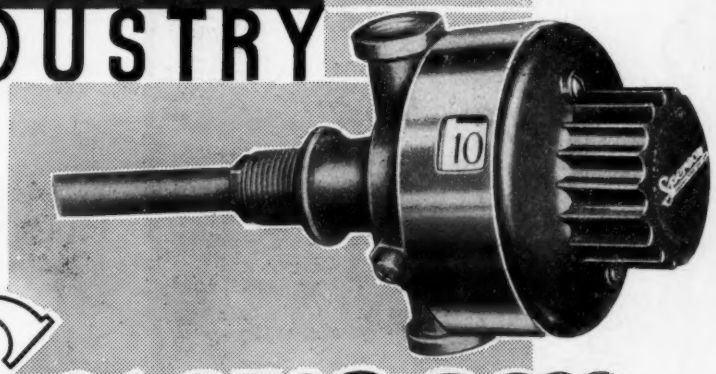

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